ARTICLE I.

THE ANNUAL DISCOURSE.

THE RELATIONS OF THE MASSACHUSETTS MEDICAL SOCIETY TO MEDICAL EDUCATION.

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OF BOSTON.

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THE RELATIONS OF THE MASSACHUSETTS MEDICAL SOCIETY TO MEDICAL EDUCATION.

A Plea for Professional Independence.

Mr. President and Fellows
of the Massachusetts Medical Society:

May I be permitted to ask your attention to some of the new questions which are pressing themselves upon those most intimately concerned with medical education? Whatever affects the training of the future members of this Society should interest you as much as those whose duty it is to superintend it. They may often need your support in settling such problems, and you may well exercise an inquiring function with regard to their plans, or their failure in carrying into execution such reforms as seem to you important.

The following appeal was recently addressed by the Johns Hopkins and other Maryland schools to all the medical schools of the country:

To the Medical Colleges of the United States:

The Baltimore Medical Colleges and the Johns Hopkins Hospital, having met for the consideration of reforms urgently

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Note.—At an Adjourned Meeting of the Mass. Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publication be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

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needed in the system of medical education hitherto in operation in this country, after a full discussion of this most important subject, have come to the conclusion that it is not expedient, nor indeed practical, for the medical schools of any State to assume alone the responsibility of adopting advanced methods; yet fully convinced of the pressing need of a change, and earnestly desirous to see it consummated, they are unwilling to let matters rest longer as they are, without at least an effort on their part to improve them. They have determined, therefore, to issue this appeal to the medical schools of the United States for their coöperation in inaugurating a national advance.

At the conference, which is asked for, the following subjects are proposed for discussion:

(1) Three years' course of six months' sessions.
(2) Graded curriculum.
(3) Written and oral examinations.
(4) Preliminary examinations in English.
(5) Laboratory instruction in chemistry, histology, and pathology.

It may not be without interest to consider how far behind the present position of Harvard in these particulars, long ago accomplished independently, such an "advance" would range itself.

(1) Instead of the proposed three years' course of six months' sessions, we already have a minimum one of three years of nine months continuous study, or a ratio of 27 to 18, with another nine months optional.

(2) A carefully graded curriculum has long existed with us.

(3) Our examinations are either wholly written, or partly oral also in those departments where the latter method is better adapted to test the practical

knowledge of the student. In other branches, laboratory and manual examinations are also required.

(4) In addition to a preliminary examination in English, a knowledge of Latin, physics, and of one of the following subjects: French, German, algebra or geometry, and botany, is required for admission to the Harvard Medical School.

(5) In addition to laboratory instruction in chemistry, histology and pathology, similar courses in physiology and bacteriology are open to our classes.

It will be seen, therefore, that a medical school may independently advance its instruction far beyond the limits which the movers of this appeal believe to be impractical for the schools of the country to adopt without concerted action. Such independent action is indeed a serious test of the sincerity of such professions in favor of reform in medical education, but must eventually ensure the true success of every school that boldly carries them into execution. This action of the Baltimore schools is commendable, however, even if its recommendations fall short of a very high standard of advance. It is to be hoped especially, that some minimum standard, at least, of thoroughness and comprehensiveness in examinations may be adopted, and that all schools shall be obliged to publish every year the examination papers of each department, with the ratio of students who fail to pass in them, as Harvard has long done. In such way only, so long as the power of conferring

degrees in medicine remains with the bodies which give the instruction, can the worth of such diplomas be properly estimated.

You may be interested to receive information concerning the workings of the four years' course in the medical school, as now conducted.

There stands now upon the official announcement of the school the statement that the degree of Doctor of Medicine is given at the end of a three or a four years' course of study, as the student may elect; and such a provision has had a place in the curriculum for ten years. The number of students who have availed themselves of this opportunity of prolonged study during the last five years has been: in 1885-86, 18; 1886-87, 21; 1887-88, 10; 1888-89, 13; 1889-90, 23.

The number of students in the third class in the same years has been respectively: 65, 71, 62, 68, 77. A comparison of these figures would seem to warrant the conclusion that a considerable proportion of the students of the third year pass naturally into the fourth, inasmuch as last year there were sixty-eight in the third class, and this year there are twenty-three in the fourth. This would be in fact a very good result, if nearly one third of a class voluntarily took the four year's course, and it might seem, therefore, as if before long the problem of making the fourth year compulsory would be easily adjusted, but an inside analysis of these figures does not afford so satisfactory a deduction.

In the first place a student may become a mem-

ber of the fourth class, and be so registered in the catalogue, without having passed in all the studies of his third year; in other words, fearing that he may fail to pass the examinations requisite for the three years' degree, he may present himself in a majority only of the third year's studies, and take the additional year to perfect himself in the remainder. Again, any student failing to obtain his degree in three years may, if successful in passing a majority only of the required third year's courses, enter the fourth class. It is evident, therefore, that the fourth class may contain the names of students who are not seeking advanced instruction, but who have failed in the ordinary three years' course, and require four years' study to graduate in the three years' course. Again, an ever increasing number of students are yearly taken into the hospitals of this city on terms of service varying from three to eighteen months. In some of these institutions they are not received until they have completed their three years of study. Thus it happens that a considerable number of such men enter their names as members of the fourth class, to which they are admitted at a greatly reduced fee, and are virtual and active members of it but a short time before their term of hospital service begins. They may have no intention of pursuing the courses of the fourth year, or of offering themselves for its degree, and, if they choose to do so, may obtain it by passing in one-half the branches required of the regular fourth-year student. In this way it happens that

the names of some of the best men in the school may appear in the list of the fourth class, and represent no genuine membership in the same. Again, students may be attracted by some of the courses of the fourth year, and remain to pursue an optional line of studies without regard to any prescribed direction, taking no active part in any of the exercises, and having no intention of offering themselves for the advanced degree. It will be seen, therefore, that the fourth class has a motley composition. It contains, in fact, some of the poorest and a few of the best students, some temporary and trifling members, a few earnest workers in advanced study.

The justice of this analysis is clearly shown by the degrees taken. In the past five years there have been enrolled in the fourth class the names of seventy-eight students; of this number only thirty-one have taken the fourth-year degree. During the same period three hundred and thirty-five degrees of M.D. have been given, in which are included the thirty-one advanced degrees above noted. In other words only thirty per cent. of those classified as fourth-year students take the fourth-year degree, or the advanced degree forms but nine per cent. of all degrees issued.

It is evident, too, what must be the effect of such a mixture upon the nature of the instruction given in the fourth year. This is largely individual in character, although given to small classes. The tone of every exercise must, of necessity, be kept down to the level of the comprehension of

the poorest student of the set, to the detriment of the better men and teachers alike. Advanced instruction under such conditions is an impossibility.

Let us consider what is the character of the instruction which makes up the curriculum of the fourth year. Fourteen courses are offered, chiefly clinical, all of which the student may attend, and among which he may make choice of certain branches in which he may present himself for the advanced degree, based on ten hours examination, two hours being the longest time required in any one course. It appears, therefore, that the advanced degree may be based upon a certain amount of knowledge in only five of these special branches. Six other courses are offered in which no examination is required. It is evident then that the fourth-year degree carries with it no definite idea of the requirements on which it is based. It may mean a certain amount of knowledge of a few special branches, or half this amount of twice this number, or in the case of hospital internes only one-half this quantity, the other half being supposed to be supplied by hospital work.

It will be seen, therefore, that the advanced degree in medicine offered by Harvard University represents a variable amount of requirements, and a greater diversity in its character. Now it is the character of the instruction, on which the whole principle of the fourth year is at present based, which demands the closest criticism. The regular three years' course, on which the degree of doctor of medicine is still almost exclusively given, is as

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crowded, and therefore as insufficient, as before this was instituted; three years in America, whereas four, five, and six years are required in other countries. It goes without saying that three-fourths, three-fifths, or three-sixths represents the amount of knowledge possessed by the American physician, compared with his European colleague at graduation. This is no question of national aptitude, but of time. What the American student needs is more time for systematic training. He needs every minute of four years at least to devote to the studies of the present three years' course, and his instructors need it just as absolutely. Some of the essential branches of medicine are now rushed and slighted by the latter, that the whole ground (as the expression is) may be covered in the scant time allotted to it, and students must pursue the same rapid pace to keep up in their courses. He who runs reads superficially. What we should have, must have, is a systematic distribution of medical studies, comprising all branches in due proportion, in a progressive course of four continuous years, and required examinations in every branch taught. We then shall have taken one step forward towards placing ourselves upon the plane of medical education of all other civilized countries.

The fourth year now is essentially a graduate course, mostly a duplication of the instruction given in the latter department of the school, and is wholly elective in character. It would be a much simpler and better plan for students who de-

sire the sort of extra training in special branches, which now constitutes the instruction of the fourth year, or to study a specialty, to take the third-year degree at the ordinary time, and then pass an additional year in the graduates' course. This, moreover, would relieve the instructors of an oppressive amount of duplicate teaching, and allow them to use their clinical opportunities to double advantage for all. As it is, the graduate course, which has attained so enormous dimensions in other large schools, has been well-nigh sacrificed with us to such a false system of under-graduate education. Graduate instruction should be restricted to graduates, and instead of attempting to educate a few men a little way in special branches, as they may individually elect, by means of the present fourth year, we should use it to raise every student at graduation to the uniform and higher standard which the profession demands.

The whole question of electives in medical education is, to my mind, one which requires serious consideration. Not only are all the courses of the present fourth year, as above stated, elective, but a beginning has just been made to introduce the principle into the regular three years' course, as well. Candidates for a degree are now required to take examinations amounting to two hours, chosen by the student from a list of seven special branches, in addition to those required of all.

Whatever may be claimed for the superiority of the elective system in the under-graduate department in Harvard over the older methods of the

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college days of some of us, and this must be considered at least an open question until we know what sort of men it makes compared with the product of the earlier system, a test not yet consummated, the practice has hitherto been maintained of taking from the graduate in arts, on entering the medical department, all such power of choosing his own course of study, and of restricting him without the slightest deviation to a progressive system carefully elaborated by his instructors. It has been believed that a body of mature physicians, practitioners and teachers, was the only competent authority to regulate the studies of the medical student in such way as to best fit him for professional life. His own opinion upon such matters has not been considered as worth the asking. It has been regarded as absolutely imperative that the degree of M.D. should have a fixed and definite meaning, and represent at least, a minimum of knowledge in the most important, general branches of medicine. Any more advanced training in special directions has been properly deferred until after such a ground-work of medical knowledge has been secured in the far too brief three years time required. The education of specialists has been regarded as entirely out of place in our regular course of study.

The recent introduction of elective courses into the crowded three years curriculum, is, therefore, in my opinion, a dangerous innovation; for, if the student have the leisure to pursue such courses, it had better be given to the attainment of a higher

standard of fitness in general medicine; or if this be regarded merely as a beginning of a required examination in all the branches taught in the school, the selection of such courses should still not be left to the student, who is too often guided by the popularity or manner of the individual teacher, irrespective of the value of the subject itself to his future professional life. It will be time enough for the introduction of electives into medical education when every student has been under systematized training for four full years, and subjected to a proper examination in every branch of medicine thought worthy of a place in a medical curriculum.

But if the present fourth-year be of this unsatisfactory or make-shift character, in reality only a form of graduate instruction under the guise of a legitimate four years' course, and if such an opinion of it be held by members of the Faculty (and upon this and all other subjects I may discuss I profess to express my individual opinion alone), why not give it up, it may be asked, and establish a genuine and compulsory four years' course? It is hardly necessary to state that this question has received the serious consideration of the Faculty, and that the answer is: lack of funds. The support of the extensive laboratory departments, or the preliminary branches of medical education, hitherto so far in advance of those of other medical schools in the country, and the salaries of the extraordinary number of teachers (some seventy, or one to every four and a half students in the school,

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a proportion which no other school in the world, to my knowledge, approaches), although the amount paid to the individual is ridiculously inadequate, absorbs every cent of the present income derived from endowments and students' fees.

The tuition is now higher than that of most of the other medical schools in the country, namely $200 per year, and the terms being also longer, nine months, the outside expenses of room and board materially increase this sum. If, in order to obtain the Harvard degree of M.D., there should be added to this amount in every case the expenses of another year, the number of students able to pay the cost of medical education in our school would be greatly reduced. Now it is not only desirable for the future character of the profession that the number of students in attendance upon such a school should not be diminished, but it would be impossible, in fact, to carry it on, even at its present standard of efficiency, under the slightest reduction of income.

A careful estimate has been made within a short time of the magnitude of an endowment fund, by the aid of which it might be safe for the school to so lower the price of tuition that the number of students might not be seriouly reduced, if the course were prolonged. It was concluded that it would be imprudent to make the fourth year compulsory, unless a permanent fund of at least $200,000 could be raised, or a guarantee income for a term of years in the beginning sufficiently large to meet the certain deficiency in the amount of

students' fees. Some effort has even been made to raise such a fund, or guarantee, among those who have hitherto been very generous in their gifts to the school, but it was found that the time was unpropitious to such an undertaking, and so the matter rests. When, therefore, it is asked why Harvard does not increase its course of medical study to the much-talked-of four years, you may reply, because she cannot. If this Society desires to see such a necessary reform carried out; if her alumni all over New England, who are in earnest in urging this measure, will assist in making it possible, you will not find her hard-worked and poorly-paid body of instructors behind you in efforts to accomplish it. Without your aid it cannot be done.

One generation ago the number of teachers of all grades in the medical department of Harvard University was only ten; to-day they are seventy, the number of students being about the same now as then. At that time there were only 142 hospital beds available for clinical teaching; now the hospitals of the city contain 1,316 beds, nearly all of which are utilized for this purpose. At that time there was no regularly organized out-patient service to which students had access; now the number of out-patients treated in our various institutions is 100,000, most of which are made of benefit in medical teaching. The regular course of instruction then given in the school occupied but four months, and the student was required to listen to a repetition of the same the second year

of his attendance. Now a progressive curriculum, covering twenty-seven or thirty-six months, is provided, with optional summer courses in addition. A degree was then given after forty-five minutes oral examination to every student who could obtain a low average in five out of the nine branches required. Now forty hours of written examinations are required, besides extensive practical tests in many of the departments. It seems scarcely credible that such a contrast between now and then can be presented. But with all that has been accomplished within the last twenty years for the improvement of medical education in Harvard, and great as this advance has been, she still lacks much of being a great and complete school of medicine.

The scientific departments have been brought up to a high and satisfactory standard of excellence, and an extensive building has been erected largely devoted to their accommodation, at a cost of nearly a quarter million of dollars, by the generous contributions of our friends. A large addition to the same is in process of construction for the better accommodation of the pathological laboratory, the munificent gift of Dr. H. F. Sears. But the departments of chemistry, anatomy, and physiology form only the groundwork of medical education, and the largest and most perfect laboratories do not alone make a great medical school. It is in the amplitude of its clinical advantages, on the renown of its clinical teachers, that the reputation of the great schools

of medicine has been based. We have fully provided for the teaching of the preliminary branches. What have we done for providing similar means of educating the student in the more important departments of clinical medicine, for the study of disease in all its forms as it affects living man? Absolutely nothing. The school does not possess one bed upon which a sick man may lie, nor furnish any accommodation for the reception and care of out-patients. In its own right it has not the means of illustrating the clinical features of a single disease, or the action of remedies for its control, or the methods of operative surgery. Not one of its large corps of clinical instructors has inherent to his appointment the opportunity of conducting his teaching in any proper manner. Every one of them owes the clinical material, which enables him to perform his duties, to his appointment to some hospital, conferred by a body in no way connected with Harvard University. If for any reason, wholly in their own control, such institutions should make other appointments than from the body of our teachers, or withdraw the existing permission to use patients for teaching, our whole system of education would collapse, and we should become simply a preparatory school, from which students would migrate after a year, to pursue in better equipped schools their advanced branches and to obtain their degree. So completely are we in the power of foreign corporations, so wholly are we indebted to them for these precious privileges.

But admitting that our clinical teachers virtually hold their hospital appointments securely enough, and that the school at present has the use of a large amount of clinical material in this way without any expense, it remains to be considered how far such opportunities of clinical teaching fall short of those which a great and successful medical school must possess. At present but very few of our clinical teachers have terms of service extending beyond four or six months of each year in any of our hospitals or dispensaries. As the length of the school term is nine months, it is evident that such teachers, even the heads of the most important departments, must have a very uncertain control over clinical material for a large part of the academic year; in fact they are dependent upon the courtesy of their colleagues in the wards and out-patient services for the means of continuing their instruction. Nor do they have any choice in their terms of service, so that these may occur at times least advantageous to the needs of the school. They have no power of selection of the cases admitted to their wards, so that it is impossible to provide illustrations of disease in any course in a systematic way, and many of the rarer affections may entirely fail of illustration. They have no individual control over the appointment of interne assistants, a matter of great importance in the successful administration of a clinic. Should a hospital board fail to reappoint a clinical teacher upon its staff, and this is an annual tenure, the school would have an in-

structor, perhaps the most important upon its list, without any means of teaching. Should the school find it desirable to dismiss a clinical teacher, or should the latter resign his place in the school, or should the professorship become vacant by death, the college would be obliged to appoint a successor from among the members of existing hospital staffs, or in other words, from among those only who have been selected for other purposes by a body of unprofessional persons in no way connected with the school. It will be readily seen how seriously this hampers the latter in its selection of teachers, and limits its power of call. Had the medical department a hospital under its own control, it might invite to its chairs the most distinguished teachers from any part of the world. Such lost opportunities have occurred more than once in the history of the school to its serious disadvantage.

In other ways also does the present system fail to satisfy the requirements of clinical teaching. Although in some of the larger hospitals students are liberally admitted, in others the number which can be present at a time is very limited, and from some they have been wholly excluded. None of the so-called general hospitals even make provision for the ward treatment of some classes of disease, so that the student must be satisfied with such knowledge of these affections only as can be acquired by the brief and irregular attendance at an out-patient department, a most unsatisfactory method for both teacher and pupil. Until equal

facilities are permitted for the study and care of all kinds of disease by those best qualified, so long as hospital boards exercise such meaningless selection in the admission of patients, it cannot be claimed that the school can give a complete practical education to its students. What one disease, for example, is more important for the physician to recognize, in consideration of its prevalence, its infectious and transmissible nature, and its grave results, than syphilis, and yet no better opportunity is afforded the student of becoming acquainted with an affection characterized by the most protean lesions of every tissue in the body, and capable of simulating so closely many other diseases that it is constantly confounded with them, than the out-patient room affords. With what degree of knowledge of this disease can Harvard University send its graduates in medicine into the world of practice?

Since this was written, there has been started in the Clinical Section of the Suffolk Branch of this Society a movement which, it may be hoped, will lead to the recognition on the part of the managers of the hospitals of this city of the pressing necessity of provision in the wards under their charge for patients with syphilis, and to State legislation with regard to the control of the inmates of charitable and penal institutions, who have this disease. I trust that you will give the report of the proceedings of that meeting your earnest consideration, and your influence also in securing the consummation of the measures there advocated.

Permit me to refer to the department in which

I have the largest experience for farther illustration of such deficiencies. We have several large out-patient clinics for skin diseases in Boston, affording, it may be said, sufficient means for teaching a special pathology, the manifestations of which are largely external. But admitting that of the one hundred individual dermatoses many of the most prevalent may come to be readily recognized by the observant student under present conditions, yet even in such affections it is impossible to study the action of remedies in any systematic and satisfactory way, so imperfectly are directions for treatment carried out, and so uncertain is the oversight, when the patient is not under the immediate control of the teacher. On the other hand there is a considerable class of skin diseases, which presents the most accessible and easily studied illustrations of some of the most serious pathological processes which affect the human tissues in general. Some of them are diseases which for ages have been sweeping mankind from the earth, and some have afforded the specialist and pathologist the means of solving the most momentous questions in the etiology of disease. We are in the very beginning of our study of cutaneous tuberculosis, for instance ; should our students be debarred from becoming thoroughly familiarized with its appearances? I had not long since to decline to receive a leper from the Wisconsin colony, as there was no accommodation for his reception in a hospital here, and where it would have been as safe to treat him as a case of syphilis, and was obliged to send

him to a more fortunate colleague in New York. Is it not as important that our students should have had the opportunity of studying a disease, which may before long become a subject of grave national and international importance, and one which is now the everyday theme of popular misconception?

A year ago I had the opportunity of detecting a disease hitherto unrecognized. It chanced that an identical case had entered the Saint Louis Hospital in Paris a year previously, where its strange nature was also recognized. Mark the differences in the opportunities afforded in the two schools of medicine for the study of a new disease! Our patient could be kept under observation, for lack of special hospital accommodation, for two or three days only. This sufficed for a mere description of the *status præsens*, and for the removal of a few lesions for microscopical examination. In the other case the patient was kept in this famous hospital for skin diseases more than a whole year under the constant observation of the teachers in dermatology, during which time all the developmental changes in the affection were fully noted, experiments as to its inoculability were made, and the action of remedies upon its course was tested. A wonderful model of its cutaneous appearances was made by the celebrated Baretta, a lasting *facsimile* of the affection. A prolonged research into the character of the anatomical changes in the disease was made, on which was based the claim that the nature of the dermatosis was as strange as its occurrence was novel. The accounts of the

two cases were published simultaneously and independently of one another, the one after every possible facility for its elucidation, the other with no such advantages. In which of two such schools is progress in the knowledge of dermatology to be looked for?

Let us briefly consider also the contrast between the equipment of this department at home, consisting merely of an out-patient service in no way connected with the school, and that of a foreign university; not that of the most celebrated and largest schools, such as those of Vienna and Paris, but of Bonn, for instance. This is a town of only 36,000 inhabitants. There are 343 students in the medical department of the university, and the number of graduates in medicine last year was 80. Its clinic for skin and venereal diseases is conducted in a building especially constructed for it. This contains a large and well lighted amphitheatre exclusively devoted to the lectures and polyclinic of the professor of dermatology, to which is attached a spacious waiting-room and a large laboratory, under the charge of the *chef de service*, for bacteriological investigations. In the wings connected with this pavilion are the wards for the in-door service containing fifty-six beds for cutaneous diseases, including naturally syphilis. Attached to the wards are ample baths especially constructed for the treatment of the patients, a chamber for the disinfection of clothing, and a kitchen department. There is also in the basement a large accommodation for animals used for inocu-

lation experiments. Such is the complete and admirable provision for teaching dermatology in a second-rate German university.

Now such deplorable deficiencies in the facilities for studying and teaching the special departments of a medical school, as exist with us, affect the progress of medicine not only in these particular branches, for, as I have just said, some of the most important recent discoveries in general pathology have been made by the workers in them. The more limited the field of study the more thorough must be the knowledge of the processes of disease it represents. It may be fairly claimed that the vast advance in the science of medicine of the past quarter-century is due to such division of study. It is for the equal advantage of medicine, as a whole, therefore, that its specialties should have the same privileges of hospital illustration as the larger departments of general medicine and surgery in a school. It is the lack of such opportunities of properly studying these branches in great measure which drives our students abroad to complete their education; and to foreign schools all will continue to go who can, until our own are as thoroughly equipped as theirs are with hospitals for every class of disease under our own control. Great clinical teachers cannot be created outside of hospitals, nor can hospitals become great without such clinical teachers. Both are alike essential to the medical school, which seeks a like reputation.

In 1810 Drs. James Jackson and John C.

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Warren issued their circular letter which led to the foundation of the Massachusetts General Hospital, in which occurs the following apposite sentence: "A hospital is an institution absolutely essential to a medical school." This letter Bowditch, in his history of the hospital, says "may be regarded as the corner-stone of our institution," and in the proceedings of the trustees, relative to the death of Dr. Jackson, it is recorded that "it was in great measure owing to the active efforts of Dr. Jackson that this great charity was founded among us." How great the loss to medical education that these two men, renowned professors in the college, celebrated leaders on the medical and surgical staff of the hospital, had not then bound in more intimate union the two institutions under one inseparable bond of government.

The schools in some of our large cities are awaking to the importance of possessing clinical material for the illustration of their courses under their immediate control, and large sums of money obtained through the liberality of generous benefactors have been lately expended in New York and Philadelphia for these purposes. The Johns Hopkins University properly establishes its hospital before its medical school. In London the hospital has long since been the primary foundation, or starting-point, of the most successful medical schools, and upon the Continent the government, which supports and controls both, has always regarded the hospital as an essential and integral part of the medical school. Can Harvard

afford longer to delay the securing of similar advantages, the means of ranging herself in all respects as a first-class school, of successfully competing with the schools of other American cities for pupils from all parts of the country, of sending her graduates into the world perfectly educated without a subsequent foreign stamp, of drawing to her post-graduate department a creditable share of the vast number of physicians now seeking such advanced instruction? Who can doubt the commanding position of a great university hospital under the absolute control and professional charge of the teachers of the school? To create such should be not only our ambition, but our immediate endeavor.

This exposition of the internal affairs of the school is made in no spirit of hostile criticism, but for the information of the public, to which we must look for means to accomplish the changes I have shown to be essential to its continued advance, for upon outside aid the possibility of such improvements must be based. The income of the school barely suffices at present to pay its running expenses, and no appeal for such large assistance can be successful without the fullest publicity as to its present status, its short-comings as well as its great accomplishments. We need at least $500,000 now to place the school on the proper financial basis to enable it to lengthen its curriculum, and to place its clinical departments upon a satisfactory and independent basis.

But, it may be asked, why is it that, if the

Faculty control the affairs of the Medical School, it does not bring about these or other changes which it desires? If it have done so much to advance the character of education, why not continue in the same course of reform? Fortunately, or otherwise, and I admit grounds for a diversity of opinion upon this point, in Massachusetts, at least, medical education is almost wholly in the hands of one body, Harvard University, and to some of you familiar with the long list of teachers in the public announcements and catalogue of the school it may appear that it is also very much under the control of a large proportion of the medical profession. It may be believed that the medical department of the university enjoys complete autonomy, and that in its hands rests the authority to put into execution every scheme for the advance of medical education, which commends itself to its skilled judgment. Let us consider how far such an impression is warranted by the facts.

In the first place every officer of instruction—professor, associate professor, clinical professor, assistant professor, instructor, lecturer, demonstrator, and assistant, is appointed by the corporation, or by this body, with the approval of the overseers. The Faculty, or the committee of professors, have merely the power of nomination. All expenditures of moneys in regular course, or for extraordinary purposes, all endowments and legacies, trusts and gifts for the benefit of the school, and the determination of salaries, are under

the entire control of the corporation. The creation of all new offices, the erection of its buildings, the conferring of degrees, are in the same hands. All measures of importance affecting the mutual relations of the medical to the other departments of the university receive final decision from the governing bodies, and any proposition affecting, however seriously, the interests of the Medical School addressed to these bodies may or may not be referred to the medical faculty for its consideration, as the former may decide. In the disposition of all such matters of vital interest to the cause of medical education and to the medical profession, the medical faculty has only an advisory power. There have been occasions when the unanimous opinion of the latter in the gravest matters has come very near being disregarded by those in authority over it. It is self-evident that such a disregard for its judgment would result in disaster to the school and the medical profession.

Nothing can be clearer then than the necessity of so constituting the membership of the governing boards that all matters which concern in any way the interests of the medical department and the medical profession, for these are identical, shall be properly comprehended and wisely administered. How satisfactorily does the present construction of these bodies meet this demand?

The government of the university is vested, under its charter, in a corporation, or president and fellows, consisting of seven members, who have the power to fill vacancies, and is, therefore,

"close" or self-elective, and perpetual. It is responsible in any measure only to the board of overseers. This is a body consisting of thirty members, who are elected by the Alumni of the academic department, and only such persons are eligible to this office as have received the degrees A.B., or A.M., or any honorary degree from the university. Five new members are elected each year on commencement day, the five longest in service retiring at that time. Forty years ago, when I first became connected with the university as an undergraduate, the overseers were elected by the legislature of Massachusetts, and one-half of them, fourteen, were, under the law, clergymen; among the other half eight were LL.D's., and one only an M.D. Upon the corporation there was no doctor of medicine. There were then but eight instructors in the Medical School.

At the present time there are three lawyers upon the corporation, but no physician. The overseers are composed of fifteen lawyers, or persons who have studied law, four bankers, three men of letters, three physicians, one clergyman, one architect, and two of uncertain or no active calling. It is apparent, therefore, that the lawyers have supplanted the clergymen, and that the latter have not only taken a back seat, but a very small one indeed. A comparison of the two professional schools most interested in the question of representation upon the board of government is instructive. The Law School has seven teachers, and

254 students. The Medical School has seventy instructors, and 290 students. In the former instruction is cloister-like and simple in method, and its affairs are easily managed. The latter must have a great and expensive plant in active relations to the life of a large city. In it extensive and varied laboratories must be maintained, the very delicate question of the supply of anatomical material must be skilfully managed, the closest connection with various hospitals under foreign control must be secured, a great corps of teachers carefully selected, and the proper relations between itself and the schools of other States and countries cultivated. The Law School is represented upon the corporation and overseers by eighteen members, whereas but three physicians have a place in these bodies.

It is thus shown that the ultimate control of the medical department in all important matters is virtually not in the hands of the medical profession, but in those of men who cannot best understand or administer them. There is neither reason nor justice in such disproportionate representation. The Medical School is the largest and most important professional department, and should have an adequate share in the councils and administration of the university. The present status is a serious reflection upon the capability of our profession to regulate medical education, or to take an equal share with other learned men in the government of the whole university. It is as unfair as if the final control of the interests of the Law School were

vested in a Board mainly composed of physicians. Now the legal profession knows nothing of the needs of medical education, or of the management of a Medical School, nor does it know more of what concerns the best interests of the academic or theological departments than do members of the medical profession, nor as much of those of the scientific, dental, agricultural, or veterinary schools as the latter. It is plain, therefore, that its great and disproportionate representation upon the governing boards should be reduced, and that vacancies in them should hereafter be filled with a juster regard to the relative importance of every department. At present the degree of doctor of medicine conferred by Harvard University, does not carry with it the privilege of expressing the opinion of its holder upon the management of his Medical School, nor does it make him eligible to the position of overseer. The lower degree of A.B., based on three or four years of subordinate, and comparatively elementary courses, and easily obtained by young men or boys with little serious purpose in their work in many cases, confers all these privileges; whereas the three or four years of earnest devotion to much higher studies leading to the doctor's title entitles the graduate in medicjne to no voice in the management of his *alma mater*. The medical alumnus is disfranchised. Such unreasonable and unjust discrimination should no longer be permitted.

Petitions from the alumni of the Medical and Law Schools for the power of voting in the elec-

tion of overseers were recently presented to the government of the university, and were referred to a committee of the overseers. At a late meeting of that body the majority report of the committee; namely, "that there is not at present any sufficient reason for making an appeal to the legislature for an extension of the suffrage," was adopted. It is evident that there is no hope of correcting this serious injustice whilst the Board is constituted as at present, and that it deeply concerns all members of our profession, who hold the enabling degree of A.B., to secure the election of medical men to fill the annual vacancies in the board of overseers. Physicians should be selected for this position who are active and proper representatives of medicine, and whose opinions would carry influence into the councils of the university, and who would see to it that the best interests of medical education are properly advanced. Two such appointments, at least, should be made each year until the medical department has secured a proper representation.

In the report of the Committee of the Alumni, appointed to suggest candidates for the approaching election of overseers, the names of seventeen persons were proposed as eligible to fill the five vacancies. Of this number two were physicians, eleven were lawyers. The nominating committee consisted of nine persons, of whom seven, at least, were lawyers. Within a few days the official list of candidates has been published. It presents ten names, of which six represent the legal, one

the medical profession. I appeal to the electors at large and in this Society to take an active part in the coming election, on June 25th, as the large body of alumni, constituting the instructors in the medical department, have no power to vote in a matter so seriously affecting the interests of the school.

If we would make our university truly national and great, we must take it out of all narrow and belittling influences, and emancipate it from every local, sectional, professional and political prejudice. Every student in every department should bear out into the world with him, when he leaves it, the feeling that he is still vitally attached to it by the alumnus tie, and will have through life some active share in its management.

Much might be accomplished in this direction, too, by the organization of an association of medical alumni, as has been done by the graduates of other medical colleges in this country and of the Harvard Law School. Such a body might be of material assistance to their school and to progress in medical education in many ways: by supporting the efforts of the faculty in raising their standard for graduation; in lengthening the period of prescribed study; in the requisition for examinations covering the whole field of medicine, instead of their present incomplete scope; in awakening public interest in the necessity of a great hospital under the control of the school; and in raising the funds so essential for putting in operation these and other needed reforms.

As an illustration of the pressing need of such outside influence, I may be permitted to sketch the history of a recent attempt, on the part of the Medical Faculty, to bring about a measure of reform of great importance to medical education. Four years ago a committee of the Medical Faculty presented, for the consideration of that body, the following proposition, which was adopted: "The Medical Faculty respectfully recommend to the consideration of the Academic Council the expediency of granting the degree of A.B. to all undergraduates who shall subsequently take the longest course of study offered at the professional schools after three years attendance in the academic department. The professional degree and that of A.B. to be given simultaneously at the end of the professional course." The Academic Council consists of the President and professors of all grades of every department of the university. Its function is to recommend candidates for some of the advanced degrees, and to consider any questions referred to it bearing upon the general educational interests of the university. At a special meeting of this body, held in December, 1886, this communication from the Medical Faculty was discussed and referred to a committee, consisting of nine professors, representing the various faculties. The committee made a report in May or June, 1887, in which an unanimous opinion was expressed, that it is desirable that Harvard students should begin their professional studies one year earlier than is possible under existing arrange-

ments. It is unnecessary to refer to the various plans proposed to effect this object, but as they were all based upon a reduction of the time spent in the academic department, the question was referred to the Undergraduate Faculty for its special consideration, and there it remained unacted upon until the past winter. This important attempt of the Medical Faculty to shorten for its students the time required for the preliminary studies of the undergraduate department, to increase the term of the medical curriculum to a corresponding degree, to enable all its graduates to enter upon the practical duties of their profession at the earlier age which prevails in all other countries, was thus long held in check by the inaction of the academic department. The teachers of the undergraduates, who pass their lives in Cambridge, have not yet come to appreciate that the academic department, as now conducted, is largely a preparatory school for the higher departments, and that the professional schools are the true flower of the university. As the secondary and high schools and academies have everywhere been obliged to conform themselves to the demands of the College, so the latter must conform itself to the needs of advanced education in all its departments. The university must not allow its highest interests to be held in check by those in charge of its lowest grades of instruction, if it would grow into an institution really deserving this title.

Since the above was written, the subject has

been again thoroughly discussed by faculties, academic council, corporation and overseers, and at last, fortunately, by the public press. The proposition to shorten the college course by reducing the number of required courses from eighteen to sixteen, which has received the approval of the academic council and corporation, would enable especially bright students to complete their undergraduate course in three years, but would not be likely to introduce many graduates to their medical studies at an earlier age than they now enter upon them. It is but a small step towards the end so essential to the Medical School, that the first years' studies in the latter shall be regarded as the equivalent of a year in the academic department towards the degree of A.B. Already the Medical School accepts the course in general chemistry at Cambridge as the equivalent of that required in its list of first year's studies, and now if the undergraduate department will accept the other branches of the first year, anatomy, histology and physiology, as substitutes for its own required courses, the desired reduction in time will be accomplished. You may scarcely believe me to be in earnest when I state that positive opposition is made to this plan, on the ground that such studies of the Medical School are not of that broad and liberalizing character as should serve as the basis for the degree of A.B. An undergraduate at Cambridge may take many courses in chemistry, physics, botany, zoölogy, vegetable and animal biology, and microscopical anatomy, all of which are accepted in the

requirements of the bachelor's degree, but the more advanced studies in kindred branches, as taught by the accomplished professors in the medical department, are regarded by some members of the Undergraduate Faculty as of a "technical," "bread and butter" character, and, therefore, not to be accepted for this purpose. A boy may dissect a frog in his sophomore year, and that is liberal and philosophical study; if, later, he were allowed to take the first year's studies of the Medical School in place of his senior studies at Cambridge, and should dissect the latest and highest mammal God created, such a study, it is objected, is unworthy to be regarded as leading up to the academic degree.

It should be the duty of medical alumni and of every member of this Society to use their full influence with members of the governing bodies of the university that this important question should be settled in accordance with the best interests of medical education; and that a proper and fair representation of the medical profession shall hereafter be found in the higher councils of the university when such momentous matters finally reach them for settlement. Under present relations the alumni have no means of knowing what important questions may be under consideration by their delegates in the Board of Overseers, so that they may present to the latter their views upon them at the appropriate time, nor are the opinions of individual members of this body with regard to any question made public. Would it not conduce to

the better interests of the university, if full publicity were given to the proceedings of this representative board of the alumni? How otherwise can electors cast a vote for the reappointment of its members understandingly?

Let us consider how fully the physician is now occupying another of the positions to which he is entitled. Next in importance to his relations to his private patients, wholly personal in nature, are his interests in the more public professional duties of the hospital. It concerns no one in the community as nearly as himself how this institution shall be governed, for whilst he has, in common with every humane man and woman, an equal desire that sickness and suffering shall be relieved, no one has in any measure the same personal responsibility involved in the practical operation of such charity as himself. For granting that all others concerned in its administration and support have an equal interest with himself to serve the cause of humanity, this can be their sole motive. Whereas, besides this, it devolves upon him individually to apply its resources to the restoration of the sick to health, and for the advance of medical knowledge. These two principles are, or should be, the very foundation stones of every such institution. They are inseparable. Practical medical science could not progress without the means of research, which constant observation and control of the patient affords the hospital physician, and equally true is it that disease comes thus more and more completely under his control.

Hospitals should be conducted, therefore, not on such narrow interpretation of their highest objects as to how many sick persons have been relieved in the year alone, but how far through them has medical knowledge been so advanced that there shall be fewer sick and larger percentages of recovery hereafter. Both the immediate practical success and the grander development of the hospital in the future rest accordingly with the physician alone. To him belongs the credit, to him should be given the untrammelled guidance of the hospital towards such humane ends.

But, it may be interjected, physicians have now virtually complete control over wards and patients, and may use such opportunity for study to its full extent. This is largely true, but this is a part only of hospital management which should be under their direction. They only are fully acquainted with the needs of the community for additional hospital accommodation, with the necessity of providing for particular classes of disease, for which often no provision is made, for so selecting the character of cases to be admitted, that equable opportunity be given for the treatment of all affections, so that thus physician and student may be enabled to familiarize themselves with every form of disease, which is not now possible with us. They only can appreciate fully the all-important relations of the hospital to medical education, and the necessity of thus educating their successors, and they should have the power of regulating this function. They can be the only possibly com-

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petent judges of fitness in the selection of their colleagues upon the staff, and of professional subordinates, and with them alone should such selection rest. They only can appreciate the importance of making known the results of their observations and the statistics of disease, and it is due to the staff and the medical world that reports of professional value should be given forth. Hospitals can become and remain great, only through the character and reputation of the staff, and the results of their labors should not be kept from the medical public.

In all such broader lines of hospital control the physician now has but little share. All such general questions of policy and action are vested amongst us in boards of trustees, either appointed by those in political authority, or in private institutions by close and self election, in which those who have all these vast professional interests, above mentioned, most at stake, have no voice. Upon some of these questions the physician may, at times, perhaps, be consulted, or they may voluntarily present to those in authority over them, their views concerning them, but beyond this they are powerless.

That this system seems right to the community at large there can be no doubt, because it is supported substantially by gifts and contributions from many of our wisest and most philanthropic men and women, and those who fill these boards of government are our most esteemed citizens. It is through our own indifference and supineness

that we have allowed it to come about. We have failed to make known the proper relations of the profession to the hospital, failed to duly assert our rights in the matter. If the public believe that we are satisfied, why should it trouble itself to do this for us? The generous and charitable recognize the probity of hospital trustees, and properly do not hesitate to confide their legacies and offerings to their care. There can be no doubt, however, that as liberal support would come to a governing board composed mostly or wholly of our best physicians. In fact, among the most generous and ready responses made to appeals for the support of similar professional objects have been those obtained by the direct personal agency of physicians amongst us.

It might be urged that, at least, it is not the province of physicians to manage the finances of any institution with large trust funds, but this is a question unnecessary to discuss in this connection, because there is no good reason why unprofessional business managers should not be associated for such a purpose with the professional board in private hospitals; and in public hospitals, both State and municipal, it need not be raised at all. The objection may also be made that, if the general management of hospitals were in the hands of physicians, they would be conducted too much in the interests of medical cliques or schools, or even for their private benefit. That is, of course, a possibility, because physicians are men, and may therefore be swayed by selfish or baser motives,

but I doubt if my hearers would, for a moment, admit the possibility of the reproach that the members of this Society who hold any position upon the many medical institutions within this State, would, were they in their absolute control, attempt to manage them for unworthy purposes. Objections of the same character may, of course, apply quite as well to any set of men outside the medical profession who may occupy such positions; even more so, perhaps. For such governing laymen, even if not of one calling, have been known to be influenced by church or political spirit, by narrow views of philanthropy, by prejudices against the proper relationship between the hospital and medical education, etc., in the administration of their trust. They are far more likely, moreover, to be unduly moved by the predominant influence of some one member of the professional staff than a governing body of physicians could be, so that a one-man power, whether used for just or unjust ends, becomes thus an easier possibility. It is my firm conviction, from an experience as a practitioner, hospital physician, and teacher of thirty years, that the interests of medicine would be better served, if the management of hospitals were much more directly under the control of the medical profession; and that physicians are far more competent to fill such responsible positions than men taken from any other sphere of life. They should have associated with them in all institutions supported by contributions and the income from private trusts, a body of skilled financiers.

Before concluding this portion of my address, I desire to say that my remarks upon the present method of governing both hospitals and university are intended to be entirely impersonal, and to reflect, not in the slightest degree, upon the gentlemen who now hold the positions of trustees, overseers and fellows. Their entire and generous devotion to the laborious duties of these places are so conspicuous, that this disclaimer should be wholly unnecessary. I have been speaking for those who are not holding such positions, and to which they have the better title.

Our profession should impress itself more directly upon public opinion in other ways, and should take a leading part in the administration of all affairs in which its immediate or remote interests are concerned. We have been far too content with seeing the most important matters of public medicine in its manifold relations controlled by men of other callings, with no such special training as we possess to comprehend, and no more natural ability to manage them than we have. We use our scientific training for the relief of the individual in sickness, for the instruction of the student, and for mutual improvement, but are satisfied to allow its broader applications to great public charities, to important questions in professional education, public hygiene and State medicine, to be managed by others, as if we had ceased to be men when we became physicians. It is not easy to understand just how such a renunciation of our rights to administer our own affairs in all their relations has

come about. No one can doubt that they concern us individually alike with the general public, and as a profession more than any other class. Certainly not one of us believes that the training of the physician unfits him for the management of any matters which concern his profession in their widest relations. He who doubts this, or thinks that some other profession or calling is better adapted to train a man to comprehend and administer the highest public functions, knows nothing of the nature of modern medical education. As a boy, he receives the same fitting for college as other boys, his curriculum in the academic department is identical with that of his classmates, except in so far as it may be specialized in certain branches which tend to quicken the powers of observation, and develop independent judgment. He passes into the medical department of the university to spend from three to six years in it, and the greater schools of Europe, in work, harder by far, and far more varied, than is that in any other professional school, and which cannot fail to deepen and broaden the mental qualities to their utmost. After such prolonged and severe training he enters the school of life, the dependent of no one, to associate with men of every age, of every social position, to put himself in intimate relation with their bodies and minds under every possible condition of human existence, still to make original investigations and to keep himself in active communion with every advance in medical and physical science.

Who can say that such a training and such a life is not the peer of any other in fitting a man for the performance of the highest duties which in any way concern his own profession at least? The old village doctor was the wisest councillor in the affairs of his community, the modern physician represents the broadest culture of his time. I cannot better close this plea for the independence of our profession than by quoting the words of one of the most independent statesmen of the day in a recent address to the medical profession, Mr. Gladstone, himself Senior Governor of Guy's Hospital. "The medical profession," he said, "has been steadily rising in power and influence and general respect, and it is my belief that it will continue to rise. . . . Another point upon which I congratulate the profession is its independence, which will enable it to pursue its stately march in the times that are coming, to form its own convictions, to act on its own principles without fear or favor for the general benefit of mankind."

Let us not be turned aside from striving to accomplish the measures I have asked you to consider by the comments so easily uttered: Oh, these are sentimental, impractical views, we are doing well enough as we are. I have lived long enough to see other important schemes of reform, regarded as just as visionary and impossible, terminate in complete fruition. I firmly believe that it rests only with ourselves to make these as successful.

But I must not close this imperfect presentation of our immediate duties towards some of the most important matters of public medicine, and of our relations to the future elevation of our profession, without asking you to give a few moments of reverent thought to those who will never be with us again on this day of reunion. Not a few of us have ceased to labor in the year which closed yesterday. Some when their work had just begun, some at full tide of life, but most in the evening of their days, when the long rest had been well-earned and could not have been unwelcome. Their lives were not eventful, but they were spent in hourly efforts to help their fellowmen retain or regain their health and happiness. Think of the vast aggregate of bodily suffering and of mental distress these departed ones have relieved during their lives: how constantly and conscientiously they walked the narrow path of duty and self-sacrifice; how often the mask of cheerfulness hid a heart weighted with anxiety and sympathy; how many the long hours of watching by the sick bed, how few for the bright joys of home. And what reward have they received, while living, for the fraction of these good deeds known of men? Their deepest knowledge drawn from science and experience, their best judgment, their most cunning hand-skill, such qualities of head, like those exercised by other professions and callings, are properly paid for in gold; but the sympathy, the vicarious suffering, the sustaining spirit of hopefulness and cheer, the renunciation of personal

ease and pleasure, which are interwoven with the former, these are not recompensed except by values in kind. Some faint appreciation on the part of the public they may have received, some true gratitude from the few, a modest support, let us hope, for those left behind, surely the consciousness of a life of hard duty well performed to the end. And what else have they received and borne, so silently and patiently, too? Often the grossest ingratitude from those to whom they have done their best unceasingly ; neglect and desertion on the part of those who have received the faithful devotion of years ; detraction and cruel abuse for no reason, or for possible limitations of judgment common to all humanity, from those who should be the last to utter it. Such are some of the shadows which may have clouded the lives of those who have gone to their rest. Now they sleep peacefully alike, those who spent their days in the exciting whirl of the large city and who lie still not far from its never-ceasing noise, their brothers on the quiet hillsides overlooking the rural scenes of their labors, and they who repose within sound of ever-changing ocean. Their work and troubles are ended, they await the longings of their faith.

Let us who survive, and those who join our ranks to-day, not fail to do our whole duty, both public and private, with all their devotion, bear all our undeserved ills with conscious equanimity, and exercise in all things that true independence, out of which shall grow the respect and position our noble profession merits.

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ARTICLE II.

THE SHATTUCK LECTURE.

INFLUENZA IN MASSACHUSETTS.

By GEORGE B. SHATTUCK, M.D.
OF BOSTON.

DELIVERED JUNE 10, 1890.

INFLUENZA IN MASSACHUSETTS.

Mr. President and Fellows of the Massachusetts Medical Society:

As you well know the time-honored Annual Discourse takes place as usual to-morrow, on the last day of this meeting, just before the annual dinner, and is unquestionably looked forward to this year with all of the usual interest. That an additional claim should be made upon your time and attention this evening is an innovation, and as such requires some words of explanation.

At the annual meeting of the Society in the year 1858 the Treasurer reported that, "the Society has come into the enjoyment of the Shattuck legacy, amounting to $9,166.87, the income from which will contribute largely towards meeting the expenses of publication to which it is especially designated." Since that time this fund has remained with the Massachusetts Hospital Life Insurance Company, invested in one of that Company's annuity policies, and has yielded interest varying from 8.25% in 1866, during the period of inflation just after the war, which was the highest rate, to 4% which has been the rate annually during the last ten years. It appears from the Treasurer's accounts, as your present Treasurer kindly informs me, that until 1872 the income was expended for printing, binding and distributing the "Annual Communications." In 1872, however, the entire income is entered on the credit side of the funds as "loaned to the Massachusetts Medical Society." This arrangement was continued from year to year until 1877, when, the unusual necessities of the Society appar-

ently having ceased, the former use was renewed and the income again paid for printing and distributing the Medical Communications.

In 1878 a prize was offered by the Society for a prize essay, which was gained by Dr. Thomas Dwight by a very admirable piece of work on "Identification of the Human Skeleton"; and the income was devoted to the payment of the award and to the publication and distribution of this essay. During the subsequent years it has been expended as previously upon the annual Medical Communications, except in the years 1886, 1887 and 1888, when it was allowed to accumulate, and a prize of $1,000 was offered for competition at large for an essay worthy of a prize, "on the climate and its modifications as influencing health and disease, or on any of the diseases of the inhabitants of New England or on any kindred subject." This prize failed to excite the interest and stimulate the competition which was anticipated from the offer of so considerable a sum of money, with such a wide range of subjects, and no award was made. A result which emphasized observations elsewhere made as to the diminished zeal for the capture of prizes, whether baited with a round sum of money or with a long established reputation stamped upon a medal. The time when the possession of a Boylston Prize was the almost necessary passport to subsequent professional advancement and reputation in this immediate community is in a somewhat distant past. Perhaps the appearance on the scene of the professional prize-taker has had the same limiting effect as the professional influence has had in other contests. Be the reasons what they may, prizes seem no longer to attract as formerly.

In the years 1806 and 1807 no less than three of the Boylston Prize Medals were secured by Dr. Shattuck's pen, but in 1888 your committee came somewhat reluctantly to the conclusion that what our forefathers termed in 1807 the

"beneficent and laudable view of improving the art of medicine, and the excitation of practitioners to bring those talents to light which might otherwise be useless to the community," were not best subserved by the offer of prizes, and accordingly your Council in 1888 voted:

"That the Committee on Publications be instructed to provide for a lecture, to be called the Shattuck Lecture, on some subject in accordance with what is specified in the will of the late Dr. Shattuck, the lecture to be delivered at the annual meeting of the Society."

In accordance with this vote the Committee in charge proceeded to its execution, and, apparently, impressed with the feeling that it was not intended that only the sins of the fathers should descend upon the children, they appointed me to deliver the first Shattuck Lecture before the Society.

I confess I should have been very glad for your sakes and for that of the Lectureship had the choice fallen on a more competent person, but neither my appreciation of the courtesy of your Committee nor my respect for the memory of the benefactor, after whom the Lectureship is named, would permit me to decline.

You therefore see why it is that you are called upon to listen to a lecture on the evening of the first day of the annual meeting, as well as to the Discourse on the second day; I hope the process will not serve simply to increase your respect for the more carnal provisions of the Cotting Fund.

As the first to discharge the duties of this lectureship it may be thought proper and pardonable if I ask you to accompany me a little while in a further brief consideration of the circumstances which gave rise to its foundation, and of the scope of its functions, thus leaving a clearer field to the legitimate and more important duties of my successors.

The fund bequeathed by Dr. Shattuck to the Massachusetts Medical Society was one of three equal funds left

by his will to three different societies; the other two being the Massachusetts Society for Promoting Agriculture and the Massachusetts Charitable Mechanic Association. The provisions of the bequest in behalf of this Society were that it "should apply the net interest and income of the same from time to time, in the discretion of the Society, or of its government, to the collection and publication, annually, by some suitable person or persons, of historical or other essays on the climate of said Commonwealth, on the diseases of its inhabitants, and on such other subjects as the said Society or its government may select."

The bequest to the Massachusetts Society for Promoting Agriculture—the oldest incorporated society but one in this State— provided that "the net income of its fund should be applied from time to time, in the discretion of the Society or its government, to diffuse a knowledge of the proper admixture of soils, so as to raise the greatest quantity of food with the least labor and expense; to encourage the raising of trees for fuel and ship-timber; and generally to disseminate a knowledge of practical agriculture."

The bequest to the Charitable Mechanic Association provided that "it or its government should apply the net interest of the fund from time to time, at discretion, to encourage improvements in Architecture, and especially in the mode of constructing cheap and convenient dwellings for the poor, and also in defraying the expense of instructing mechanics' apprentices in the knowledge of the useful arts."

As has been shown by the hasty review of the uses to which this Society has put the income of its funds, the medical objects which the donor had in mind and at heart have been to a considerable extent realized. The Society for Promoting Agriculture, with a total fund of about $120,000, has done much for the farmer of the State of Massachusetts in improving the breeds of various domestic animals by the importation of foreign stock, and in other

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ways has disseminated a knowledge of practical agriculture; but I cannot learn that it has caused studies to be made of the proper admixture of soils, so as to raise the greatest quantity of food with the least labor and expense, or has encouraged the raising of trees for fuel and ship-timber. The generation which has grown up to man's estate since this bequest was made has solved those questions for itself in a different but a very practical way—by moving West to the plains, and to the forests of Michigan and Puget's Sound; but even there at no distant date, if things go on as they have done, if there is no rotation of crops and unchecked forest fires, such information as Dr. Shattuck thought desirable for Massachusetts in 1854 may not be superfluous.

On the other hand, singularly enough, with the increased knowledge of the diseases of domestic animals and of their relation to those of man, and with the development of veterinary science, it has come to pass that this same Agricultural Society, through Drs. Peters and Ernst, is employing a portion of its income in an investigation of tuberculosis —a disease than which there is none more prevalent, none causing so many deaths in this State and throughout New England—and is thus doing work of a kind which thirty-five years ago could only have been expected to emanate from medical sources.

The Charitable Mechanic Association has hitherto, I believe, done little or nothing towards realizing the specific wishes expressed by the testator, and certainly nothing especial towards encouraging improvements in the mode of constructing cheap and convenient dwellings for the poor. But other agencies have in a certain measure brought about this very desirable end, and capital, philanthropy and hygiene have all found a remunerative account therein.

From the last annual report of the trustees of the Peabody homes for the poor in London, in which especial attention

was given to sanitary construction, it appears that the birth rate in these homes is 8.72 per 1000 above the average, the infant mortality is but a little over half the average, and the total death rate is 1 per 1000 below the average. Yet these buildings pay a moderate per centage upon the amount invested, although their construction can hardly be called cheap. Here in Boston there are now numerous tenement houses, which fairly deserve the name of apartment houses, occupied by poor people, where the sanitary conditions are good, the standard of health is high, there is no overcrowding, and which pay fair returns to the owners. There is also a Coöperative Building Association which aims to secure the ends sought for in this legacy, and thus indirectly lowers the death rate of the city.

These bequests were not large—even for the day in which they were made, certainly not for ours—and were individually smaller than others proceeding from the same source, but they were eminently characteristic of the man, eminently indicative of his interests during life and of the direction which his hopes for the future took. He was not a sentimentalist, but nothing human was foreign to him; he was at home with all sorts and conditions of men, he had a constant interest in and sympathy for humanity. He knew the farmer, he knew the mechanic, he knew the homes of the poor. His father, a graduate of Harvard, a man of large frame and powerful physique, spent his strength as a country doctor in the last century, going on horse-back over the hilly regions of the northern part of Worcester County, succumbed to the exposure and labor of his profession at the early age of fifty-one years, and leaving his son an orphan at the age of eleven years. Hence, he knew too what it was to make one's own way; he knew—to use his own quaint expression—the value of the "healthy stimulus of prospective want," but he also knew the value of encouragement and of a helping hand held out at the right moment.

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He himself graduated at Dartmouth College. As a medical student part of his time was spent at the University of Pennsylvania, where he took his degree in 1807. He obtained a knowledge of country practice by studying with Dr. Amos Bancroft in Weston, and of city practice in connection with Dr. Danforth in Boston. He had previously received a medical degree from Dartmouth, and subsequently a third medical degree from Harvard. So that, although not having studied abroad, his medical education was for that time a broad one.

While in Philadelphia, as his letters written from there show, he undoubtedly came under the influence, to some extent, of Dr. Benjamin Rush, who was then at the height of his reputation as a teacher, and who was a large figure in the Society of the time, and he was one of comparatively few from this neighborhood who came directly in contact with Rush. Of Rush, Dr. Holmes said, addressing this Society in 1860:[1]

"If I wished a student to understand the tendencies of the American medical mind, its sanguine enterprise, its self confidence, its audacious handling of Nature, its impatience with her old-fashioned ways of taking time to get a sick man well, I would make him read the life and writings of Benjamin Rush. Dr. Rush thought and said that there were twenty times more intellect and a hundred times more knowledge in the country in 1799 than before the Revolution. His own mind was in a perpetual state of exaltation, produced by the stirring scenes in which he had taken a part, and the quickened life of the time in which he lived. It was not the state to favor sound, calm observation. He was impatient, and Nature is profoundly imperturbable. * * * * * * * Dr. Rush must have been a charming teacher, as he was an admirable man. He was observing, rather than a sound observer; eminently observing, curious even about all manner of things. But he could not help feeling as if Nature had been a great deal

[1] Currents and Counter-Currents. Annual Meeting, May 30, 1860.

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shaken by the Declaration of Independence, and that American art was getting to be rather too much for her—especially as illustrated in his own practice. He taught thousands of American students, he gave a direction to the medical mind of the country more than any other one man, perhaps he typifies it better than any other. It has clearly tended to extravagance in remedies and trust in remedies, as in everything else, etc. etc."

Dr. Weir Mitchell, his fellow-townsman, on the other hand (A Commemorative Address delivered at the Centennial Anniversary of the Institution of the College of Physicians of Philadelphia, 1887), says of Rush:

"With reverent doubt of my powers to do justice to the greatest physician this country has produced, I approach the task of recalling to your memories the vivid and emphatic personality of Benjamin Rush. His life invites a less hasty biographer, and is full of such seeming contradictions as can only be explained by the belief that the earnest, decisive, and mutinous nature of a man, proud rather than conceited, got the better of the principles by which he honestly strove to guide his conduct. * * * * How shall I briefly bring before you the career of this restless being? Relentless energy drove him through a life in which ardent sense of duty, large-minded philanthropy, love of country, devotion to his art and its science, immense belief in himself, were the motives to industry. * * * * He was a statesman, a scholar, an army surgeon, a punctual and careful physician, an actively religious man, a far-seeing and courageous philanthropist, and a sanitarian far in advance of his day. These are what I might call four careers in all of which he excelled, unaided by secretaries or modern means of condensing and regulating labor; one such suffices most men."

Dr. William Pepper, another Philadelphian, says of Rush:[1]

"Rush was evidently a perfectionist. His enthusiasm over the possibilities of human nature continually breaks

[1] Address delivered before the American Medical Association, June, 1889.

out intoexpressions of sincere exuberance. I fear he drew his inspirations more from the experience of his own nature, refined and elevated, which required no excitement but the claims of duty, and no pleasure but the pursuit of knowledge and truth, than from the observation and study of men as they actually exist.

"The truth is that Rush was at all times and in all places and before all else a great physician. He had entered public life from a sense of patriotic duty; he had labored for the improvement of society because he was irresistibly impelled by his large humanity; but he threw himself into the service of medicine with passionate intensity. Ramsay, a favorite pupil and intimate friend, tells us that Rush wrote to him: 'Medicine is my wife, science is my mistress, books are my companions, my study is my grave.'"

Dr. Shattuck shared to some extent the tendency of his day to polypharmacy; he did not eschew remedies of large bulk, he did not always think it necessary to stoop to tickle the palates of his patients, he had confidence in medicines, as he had in other methods of interfering with disease, and used them with courage when he thought interference necessary. But I do not think, in his case and in that of many others in New England of whom he was a good type, that this was so much because he thought "there were twenty times more intellect and a hundred times more knowledge in the country in 1799 than before the Revolution"; so much because he "felt that Nature had been a good deal shaken by the Declaration of Independence, and that American art was getting to be too much for her"; in other words so much due to the influence of the teaching of Rush —as it was due to a mental and moral inheritance typical of his time. His father, as has been said, had carried on a guerilla warfare with disease over the hills and valleys of Worcester County for twenty-five years, until he fell before it himself; his grandfather, a farmer, at the age of sixty-five shouldered his gun and followed the British on the 19th of April, 1775, from Lexington to Cambridge, having

previously marched from Littleton; and his great-grandfather, also a Harvard graduate, was an Orthodox clergyman whose life was a contest with false doctrine, with the flesh and the devil. This was not a paternity for a contemplative offspring, for an expectant generation, for a hand-folding philosophy. It was in the blood to be up and doing, to wrestle with some antagonist and to strive to prevail over him; whether the antagonist took the form of a vigorous climate, of depravity of the spirit, of unjust taxation or of weakness and error on the part of the flesh. It was just possible for the strong men of that generation to sit down and see nature lead, but not to restrain themselves from pursuing and taking hold of her when she led us it seemed to them astray. It was their duty to *smite* the Philistine, not to leave him to the chances of the slow corrective influence of time.

The self-determining power of the will, which had accomplished much in the preceding two hundred years, had not abdicated in the early part of this century, nor yet had it adopted the gentle disguises of Christian Science, of the mind cure or of hypnotism. Bad medicine was good for disease, as self torture was good for the erring. *We* take both our religion and our medicine more comfortably and less seriously. But then he who took a distasteful remedy had placed his comfort as a precious sacrifice upon the altar of health. The nose of the patient as of every one else must be kept to the grindstone.

It was felt that the doctor's duty was to stand between the patient and the disease, but not *always* with the apothecary at his side, as appears from old letters of Dr. Shattuck's which have been preserved. A young clergyman, whose first vigor was spent, is sent on a horseback journey with a companion. Another clergyman, whose delicate wife was suffering in 1825 from some early form of tuberculosis, is advised: "If your wife can conform to rule in

diet and exercise and exposure she may be restored. If the trammels are too galling to her free agency she slackens the progress of the cure and renders her situation still precarious. Let her case terminate as it may I feel that I have honestly intended her service. I am sorry that instinct rather than reason governs one so elevated among the national tribes." And a year later, after the death of this patient who lived at a distance: "I became quite convinced when I learned her impatience under the use of the only earthly means that could serve her (viz., warmth, rest, diet, good nursing, with the healing hand of time) that she could not attain health more."

To a College Professor, who asks as to his probable future health and ability to continue in the discharge of his duties, notwithstanding an impaired constitution, Dr. Shattuck wrote in 1826: "Your diet, wearing apparel, exercise in the open air, warmth and ventilation of your apartment, bathing (medicated, warm and shower), attention to an easy state of bowels, and attention to a wholesome variety in your intellectual labor and to a healthful alternation between labor and rest, are in my opinion adequate remedies to secure you the possession of a working power equal to all the duties of your professorship. I would underwrite at a less rate at this time on your continued life and power to labor ten years to come, than I should have felt justified in doing it at when you were here a year ago."

In another letter of advice I find the following: "You must turn Quaker, and remain silent; give your lungs rest and they will recover. After all, careful nursing is the most essential to you, pediluvium, friction, diet, &c."

Yet such expectancy, such appreciation of the *circumfusa* and *ingesta*, such recognition of self-limitation proceeded from the same pen as: "Enquire of Mussey his opinion of the expediency of maintaining over your entire chest a pustular eruption for at least two or three months"; or as a

prescription for a thousand pills, three pills every day for a year,—a prescription the remembrance of which was treasured up unto the detriment of the third generation when applying for a hospital appointment. A compound prepared with unauthorized elegance for a rich and influential client at his request, found its way out of window instead of down the patient's throat, and the genuine stuff was procured and submitted to. It is evident that the patient was held in view for treatment quite as much as the disease. Yet, when he wished to endow a professorship at the Harvard Medical School, it was a chair of Morbid Anatomy, not of Materia Medica and Therapeutics, which was selected.

It is true that civil commotion stirs up thought and quickens mental activity; but, in spite of this, I am constrained to believe that the remote influence of Calvin had quite as much to do with the best of medical practice during the first half of this century in New England, as had the immediate teaching and example of Rush.

At the time the bequest which gives rise to this lectureship was made, the study and description of disease as exhibiting itself in this Commonwealth and in New England was in some ways easier and in some ways more difficult than at the present time. There was a much more homogeneous population, habituated to its surroundings and to the climate. The pursuits were less varied, the effects of competition and nervous strain less great. There was less crowding and less movement of individuals to and fro. There was less division of medical practice; there were more doctors, I think I may say—at least at the centres of population—who knew *all* about more people than now, and not merely about one member of a family or perhaps only about one organ of one member of a family. The trusted physician in the city was then, as is happily still the case in some parts of the country, the adviser, not merely the prescriber, for the family; he was in many ways the guide, the coun-

sellor, the friend. His memory and his note books furnished something nearer the theoretical bureau of domestic anthropometry than anything we have at present.

On the other hand there were lacking the abundant facilities for rapid exchange of medical thought and observation all over the world which exists now; and there were lacking altogether or only existing in a small way, the three great sources for the study of the development, the course and the variations of disease in a given population, viz., boards of health, hospitals, and a trustworthy registration of vital statistics.

The Massachusetts Hospital was the only hospital for general diseases in New England; our State Board of Health was not started until 1869, and the Registration of vital statistics, which has been enlarged and improved in recent years, was first undertaken by the State in 1842 and was much less perfect than now.

Under the circumstances, therefore, which existed in 1854 and the immediately preceding years, there was a *raison d'être* and a promise for utility in a bequest like this of Dr. Shattuck's, such as perhaps would not suggest themselves, at least not with as much force, to-day. Certainly to one who was fond of and somewhat sanguine about the compilation of facts and figures; who for many years was President of the American Statistical Association; who was a friend and supporter of Lemuel Shattuck—one of three Commissioners, as Dr. Walcott reminded you last year, appointed in 1849 under the authority of this Commonwealth to make a sanitary survey of the State—to such an one the objects for which he designated this bequest, must in the early fifties have appealed with peculiar force.

Every well regulated hospital may be regarded as a post-graduate school whose courses, if rightly followed, should make some additions to the reliable records of clinical observations and to the sum total of the knowledge of

disease, in its neighborhood at least. In comparison with the single hospital thirty-five years ago, one finds—in addition to the large City Hospital of Boston, the Carney Hospital at South Boston, and to all the small incorporated special hospitals doing an admirable work in this city—that Lowell has two hospitals, one organized first as a Dispensary (?) in 1840, the other incorporated in 1867; Lynn one hospital, opened for patients in 1883; New Bedford two, one opened in 1873, the other in 1885; Cambridge one, incorporated in 1871, and opened for general patients in a new building in 1886; Newton one, opened in 1886; Newburyport one, opened in 1884; Haverhill one, opened in 1882; Salem one, opened in 1874; Quincy one, opened in 1890; Taunton one, opened in 1889; Fall River one, opened in 1888; Worcester, a City Hospital, opened in 1871, and a Memorial Hospital opened in 1888; Clinton one, opened in 1889; Springfield, a City Hospital since 1879; Pittsfield, a hospital since 1884; North Adams one, opened about the same time. In addition to these already opened and at work, plans are under discussion for hospitals in Malden, Marlboro' and Plymouth.

With the growth and enlargement of some of these Hospitals, which the future is sure to bring, why may not fresh contributions be expected from their physicians as to the effect of locality, of certain occupations, of certain race admixtures upon health and diseases. The introduction of the Celtic element, which went on so vigorously during the middle third of this century, has had, as we all realize, an enormous influence upon the vital statistics of Massachusetts; the effect of the French Canadian and the Italian immigrations will probably be less, but just what the future alone can show. The race admixture at the Boston City Hospital is already so marked that a smattering of several foreign languages is by no means an unnecessary qualification on the part of those in attendance, and the behavior of

the Latin race under disease offers a marked contrast to that of the Anglo-Saxon.

You are all aware how much our State Board of Health has done for and through the profession in its annual publications in regard to the subjects provided for in this bequest; with increased liberality on the part of the State its work is constantly increasing. As a new progressive step you will be glad to know there is in contemplation the appointment of a salaried inspector, whose duty it shall be to investigate and report on the causes and conditions of local epidemic outbreaks, in the manner in which this has been done by such men as Ballard, Buchanan, Thorne and Radcliffe, in the service of the English Local Government Board. Here is a field of honorable medical ambition for the right men.

The registration of vital statistics has now been carried on long enough in this Commonwealth, is now sufficiently accurate and is compiled with such care as to make it of great service in any relative study of the past and present of diseases here. The statistics accumulated by the immense extension of life insurance, and the meteorological records of the United States Weather Bureau are other advantages of which the student can make use to-day. So that, notwithstanding the decreasing homogeneity and the increasing density of population, notwithstanding the complexity of pursuits and the exaggerated wear and tear of life, the task of one who seeks to investigate the climate of the Commonwealth and the diseases of its inhabitants is certainly simplified in some important particulars—at least over the time, not so long distant, when the inquirer's main resource was a slow and precarious correspondence by letter with brother practitioners.

INFLUENZA.

Some such thoughts undoubtedly occurred to many when the recent pandemic of influenza swept over the world. It seemed positively churlish to deny hope the impulse to spring once more eternal in the medical breast. With the aid of the telegraph and the submarine cable; of rapid transit by sea and land; of numerous weekly medical publications as well as of the daily press; of the facilities for collective investigation afforded by the frequent meeting of medical societies in Europe and the United States, by the machinery of central bureaus and local boards of health with mortality rates and registration of returns; and above all with the aid of the entirely modern bacteriologist armed with his immersion lens, his culture tubes and his staining preparations—was it not legitimate to hope that, if with the coöperation of all these more or less modern appliances we searched out the secrets of Nature faithfully, we should be able to penetrate a little farther behind her mysteries in this particular disease? Was it not legitimate to trust that we should be able to bequeath to the future something more than we have received from the past, should at least definitely determine some of the doubtful points which presented themselves after the preceding pandemics to puzzle or ensnare the Sydenham Society, and Sir Thomas Watson and Hirsch and other sources of previous wisdom? In short that we should be able to say to our successors something more than that an "influence" coming from we knew not whence, disappearing we knew not whither, and making a large proportion of mankind ill we knew not why, had afflicted the world at a certain date? It is now more than six months since the influenza made its appearance as an epidemic in Western Europe, and more than four months since it ceased to be epidemic in this Commonwealth.

In Berlin, in Munich, and in Paris, Committees of Medi-

cal Societies, aided by Government, and in London the Local Government Board, have been at work upon Collective Investigations of the epidemic; the Munich Committee's returns were to be in March 15th, and the Berlin Committee's returns March 21st. The results have not yet reached us, though their probable tenor in each country may be guessed at from the reports of Society meetings, and communications to Medical Journals, all of which I have reviewed. I have been struck with the re-appearance of the same questions arising to perplex observers in turn in all affected regions; with the inevitable tendency to make the disease fit the limited observation of the individual; with repeated proofs of the strength of the temptation to construct a theory upon what passes before one pair of eyes. I even think papers in Medical Journals will show that men who inclined to the explanation of contagion found a larger percentage of enlarged spleens than men who held to the miasmatic theory!

The time which has elapsed is not sufficient for the record and comparison of observations and experiences in different parts of the world; the distance from the pre-occupations caused by the rapid succession of crowded days is not sufficient to afford the necessary perspective for so extended a field.

I shall ask your attention then, during the time which remains, to a brief consideration of some points in regard to Influenza as exhibited in the last epidemic in Massachusetts. My own interest in the subject is derived from the experience of a large hospital service, of private practice, of personal illness in Boston, and of a general experience in Paris—all within the space of six weeks, from the middle of December, 1889, to February 1st, 1890, and of a pretty careful review of the old and recent literature of the subject since the cessation of the epidemic.

So quickly do events succeed each other in our age and so

rapidly are the scenes of life shifted, I do not doubt that to some of you the subject seems already old and threadbare. I fear I cannot offer a sure key to any of its mysteries, and I may not tell you anything new, and I may weary you; but I shall, at least, protect myself from a repetition of the comment of an esteemed colleague who, when asked lately about a certain address before a Medical Meeting, exclaimed: 'Oh! you know what it was like, some quotations from scripture, and not a word about medicine!"

ORIGIN.

Where did the Influenza have its origin, where did it come from? Europe first heard of it in Russia, where it was reported as epidemic about the middle of last October—hence it has frequently been spoken of since as the Russian Influenza;—a designation given for the same reason in several previous epidemics. At the same time that influenza exhibited itself in epidemic form at St. Petersburg (60° N. Lat., 30° E. Long.), the middle of October, it was also active at Tomsk, 1800 miles to the eastward in Siberia (56° N. Lat., 85° E. Long.). A severe epidemic is reported[1] to have run its course in Bokhara, a district of Chinese Tartary (40° N. Lat., 85° E. Long.), between the end of May and August, 1889. This is really about all the information which we have on the subject of origin up to date. For affording trustworthy epidemiological data the heart of Asia is about what it was in the middle ages or at the time of the Garden of Eden, and, although further time for corrected returns from these outlying districts may possibly produce something less vague, the probability is that our successors will learn from us as to the origin of this epidemic what we have learned from our predecessors as to some others—"that it came from the East."

Present information indicates that the *epidemic* began in

[1] Prof. Drasche, Wien. Med. Wochschrs. No. 6, Feb. 8th, 1890, p. 219.

Berlin the middle of November, in Hamburg about the first of December, in Leipzig about December 10th, in Cologne December 1st, in Paris November 26th. (November 26th was the date of the outbreak at the great Louvre Stores). In Southern Germany, in Austria, in Turkey it was later. In Wurzburg and Munich it began about the middle of December; in Vienna, December 12th; Pesth, December 15th; Belgrade, December 16th; Bucharest and Sophia, December 24th. To the north of Paris, it began at Brussels December 12th, and Antwerp December 16th. At London it began the end of December; Madrid, December 14th; Malaga, December 12th; Lisbon, December 21st; Alexandria, December 25th; Cape Town, first week in January.

INFLUENZA IN MASSACHUSETTS.

Our State Board of Health has again justified the position which it has made for itself, by sending out promptly in January circulars to physicians, public institutions, and factories and employers throughout the State, thus providing for a Collective Investigation of this epidemic within the borders of Massachusetts. The board has very courteously allowed me to look over and collate the replies which have been received, and I am therefore enabled to give you more extended results than would otherwise have been possible, in anticipation of the Board's Annual Report.

The Secretary, Dr. Abbott, will work over these same returns for the Board's report; but it is not amiss that returns as complicated and as difficult of interpretation as these are should be handled independently by more than one individual, that possible errors or prejudices may be modified, on one side or on the other.

The following is a copy of the circular. Those sent to physicians and public institutions were the same; those sent to factories and employers varied as indicated in questions

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numbered 1, 3, 4, 5 and 6. The question in regard to sex is somewhat ambiguous.

COMMONWEALTH OF MASSACHUSETTS.
Office of State Board of Health,
13 Beacon Street, Boston,
JANUARY, 1890.

DEAR SIR:—

In view of the general epidemic of influenza now prevailing, the State Board of Health desires to obtain such information as is possible regarding its appearance in Massachusetts during the present season, and therefore respectfully requests a reply to the following questions:

1. What was the date of first appearance of the epidemic in your neighborhood? (or institution?) (or among your operatives?)
2. In what week was it most prevalent?
3. What estimated proportion or percentage of the population in your community was attacked? (or of persons employed by you?)
4. What ages or periods of life were most affected?
5. Which sex was affected most severely?
6. What was the average duration of the attack? (or length of absence from work?) in days.[1]
7. What symptoms predominated in the cases under your observation?
8. What other diseases were increased in frequency or severity simultaneously with the epidemic of influenza?

MANUFACTURER'S CIRCULAR.

4. What proportion or percentage were obliged to leave their work in consequence of such illness?
5. What was the average duration of the attack?
6. Which sex was affected most severely?

Respectfully yours,
SAMUEL W. ABBOTT,
Secretary.

From physicians 192 replies were received; from Public Institutions, 24; from factories and employers, 178 replies were received.

[1] In the Mercantile Circular Nos. 4, 7 and 8 were omitted.

PUBLIC INSTITUTIONS—SUFFOLK COUNTY.

The returns from nine of the principal hospitals of Boston, including the Marine Hospital at Chelsea and the Boston Lunatic Hospital at South Boston, cover about 2000 people, and indicate that the epidemic began in these institutions about December 21st, and was most active during the week from December 28th to January 4th. The City Hospital reports the earliest first case occurring December 16th, the New England Hospital the latest first case occurring December 23d. The McLean Insane Asylum, Somerville, reports the smallest percentage of inmates affected, viz.: 10%. With 336 inmates there were 34 cases, of whom 16 were male and 18 were female; only two patients were attacked, the other 32 cases being among the attendants or employees. The New England Hospital for Women reports the largest percentage (75%) of inmates affected. At the Children's Hospital 75% of officers and employees were attacked, and only 33% of the patients; adults reported as somewhat more susceptible than children. At the Adams Nervine Asylum 45% of the inmates—30 out of 65—were attacked; at the City Hospital 25% of the patients and 25% of officers and employees. At the Massachusetts Hospital, Dr. Pratt writes: "it seemed at one time that every one resident in the Hospital had symptoms of the disease," and nurses and attendants were especially victims. At the State Prison, Charlestown, 40% of the inmates were attacked, the first December 21st; and Dr. Sawin writes, "there was not a single case of pneumonia at the prison, although I saw many cases in private practice"; on the other hand, 8% of those affected had diarrhœa, and bronchitis was as usual frequent.

Conclusions.

As to dates these returns agree pretty well with those of the mercantile companies, and those of the doctors, with

the natural difference that these first cases are reported, as a rule, a few days later. Of seven reporting the percentage of patients attacked, the average is 41%. I do not feel justified in drawing any positive conclusion as to sex. There is nothing which appears positively to indicate exposure to the atmosphere or contagion as a factor, unless in the case of the McLean Asylum, where only two patients were attacked, and of the Massachusetts Hospital where the attendants suffered more, one infers that the attendants were more out of doors. At the City Hospital, on the other hand, the percentage of the two classes was equal; and in regard to the Children's Hospital, where 75% of officers and employees suffered but only 33% of patients, it is to be remembered that children were in general less susceptible to influenza.

Of these institutions, the City and Massachusetts Hospitals are the only ones reporting pneumonia as a complication of or sequel to influenza.

PUBLIC INSTITUTIONS—OUTSIDE OF SUFFOLK COUNTY.

Outside of Suffolk County, 12 public institutions reported, of which five are Insane Hospitals, one (at Tewksbury) an almshouse, and the others are schools or reformatories. Danvers is the most easterly and Northampton the most westerly point represented, and, strangely enough, each reports its first case as occurring on the same day, December 25th, and, contrary to what might be expected, the epidemic reached its height at Danvers Lunatic Hospital as late as the third week of January, whereas at the similar Northampton institution it culminated the second week of January; at Danvers 30% were attacked, but at Northampton only 10%.

The Tewksbury Almshouse (North Middlesex), with its constant receipt of inmates from Boston, reports the earliest first case, December 18th, only two days later than the first

case of the Boston City Hospital; the Primary School at Monson (East Hampden) and the Lyman School for boys at Westboro' (West Worcester) come next with December 19th, although the Homœopathic Insane Hospital at Westboro' and the Massachusetts Reformatory at Monson do not report their first cases until December 22d and December 26th respectively.

The latest first cases occurred at the Lancaster State Industrial School (Worcester) and the Worcester Insane Hospital, at each January 3d, but the most active week at the former was the third week of January, and at the latter the second week. The Taunton Insane Hospital (Bristol) reports its first case December 30th; the State Farm, Bridgewater (Plymouth), December 31st; but the culminating week at the former was the third week of January, and at the latter the second week.

The epidemic reached its height a week earlier at the Primary School at Monson than at the Lyman School, Westboro', last week of December and first week of January respectively, although it first appeared at both on the same day. The largest percentage attacked was at the Primary School, Monson (56%); the smallest percentage (5%) at the Worcester, and the next smallest (10%) at the Northampton Insane Hospital. The Lyman School for boys reports 50%; the Lancaster Industrial School 42%; the Reformatory Prison for Women, Sherborne, 40%; the Tewksbury Almshouse 40% of its officers, and 33% of its inmates.

The Danvers Hospital, with 30% of inmates attacked, reports an intercurrent epidemic of measles with nine cases, and one of erysipelas with six cases; there were a few committals in which the exciting cause seemed to be influenza; the senile were less frequently affected by influenza and females more than males. At the Westboro' Hospital "more females were attacked, but the worst cases were males";

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at the Worcester Insane Hospital more males were attacked. The Women's Prison, Sherborne, is the only institution specifying insomnia as a complication. Only four of this group report pneumonia as a complication or sequel.

Conclusions.

In the reports of these 12 institutions it certainly does not appear that geographical position was an important factor as influencing the date of the first case or the maximum week. How far contagion could have had an influence we have no data to decide; all these institutions are on more or less frequented lines of travel and all receive inmates from the outside world.

The letter[1] accompanying the report of the Lyman School for Boys, Westboro', taken alone, suggests contagion. No very definite conclusions can be drawn as to the matter of sex.

The average per cent of the affected at eleven institutions reporting was 32%, compared with an average of 41% in Suffolk County.

MERCANTILE AND MEDICAL RETURNS.

Returns were received from 178 manufacturers and mercantile houses, representing all the counties of the State except Dukes and Nantucket. Of these I have tabulated 142, leaving out those which for one reason or another seemed too vague or unreliable. It cannot be said that all those, by any means, which have been included are entirely trustworthy; some are evidently more careful than others; but on the whole, perhaps, the errors to some degree tend

[1] "The first case was a teacher in one of the Schools who had charge of thirty boys. About December 14th she spent a day in Boston, and was taken ill December 19th, recovering in four days. In about five days the boys in her school began to be sick, and 28 had the disease in some degree within two weeks. I should say all were taken sick within one week and before the disease appeared in any other school. The disease then invaded the nearest school, and in a few days had reached all of the six which make up the institution. Out of 190 boys, 132 had the influenza."

to correct each other. I have endeavored to compare these returns from manufacturers with each other and with those from the doctors throughout the State, of which 192 were received and of which I have tabulated 179. I fear the success as to results is not proportionate to the amount of labor involved, but such as it is I will ask your attention to it.

Beginning with south-eastern and eastern counties, I will pass to the western counties in order.

NANTUCKET COUNTY.—This Island County, standing with its neighbor Dukes alone as outposts in the Atlantic, sends only medical returns, for the good reason that manufactures do not exist. There are five medical returns from the town of Nantucket and vicinity. One places the first case December 20th, and the maximum week the first week of January; the other four range the first case between December 30th and January 4th, three make the third week of January the maximum week and one the second week.

Three think males were more affected, and two females. One reports pneumonia as increased, and two pulmonary diseases. The only return as to proportion of population affected states 25%.

DUKES COUNTY.—From this Island County also there are only medical returns; here, as at Nantucket, the population lives mainly by the sea.

There are five returns. The earliest first case is reported from Vineyard Haven on the north shore December 25th, but this was one of several exotic cases brought in by the Revenue Cutter Gallatin, and another return from the same place dates the first native case January 2nd; the other three returns from Edgartown, Cottage City and West Tisbury date the first case January 1st; three returns, giving

a maximum week, name first, second and third weeks of January; these same returns give 20%, 33% and 66% as the proportions of population affected. Average 40%. Two returns state that males were more affected, and one that females, "because males had greater power to throw off the disease quickly." One return gives pneumonia and one pulmonary diseases as increased.

Conclusions.

The returns from these island counties indicate that influenza invaded them two weeks later than the mainland farther east. In the winter months they have comparatively little communication with the mainland; the population is thus less exposed to contagion, though freely open to atmospheric effects, especially those coming from the eastward across the Atlantic.

Before drawing the obvious conclusions in favor of contagion and against atmospheric miasm, I ask your attention to two interesting letters.

Dr. Banks, Surgeon Marine Hospital Service, writes from Vineyard Haven, Jan. 25th:—"Dec. 25th I treated seven cases, seamen landed from the Revenue Cutter Gallatin which put in here in consequence of this trouble with her crew.[1] This is the first record I have of the appearance of the epidemic here, and shortly after I was seized with an illness of a like character. . . . . .

"In this connection, as showing the undoubted atmospheric influences in the propagation of the disease, read a report similar to mine comprising 17 cases on the Revenue Cutters[2] Woodbury and Dallas at Portland, Me., which occurred on board these vessels while at sea attending to their duties in cruising along the coast."

Dr. Luce writes from West Tisbury, Jan. 31st:—"I first

[1] Abstract of Sanitary Reports, January 3rd.
[2] " " " " 17th.

observed the epidemic during the spring of 1889, when it appeared in its greatest severity during the months of March and April. It was not then epidemic in the State, so far as I know. I should think that at this time about one third of the inhabitants were affected. . . . It was most frequent among males, especially among fishermen and those exposed to inclement weather. The symptoms in this epidemic were principally referable to the respiratory organs.

"The present epidemic began about the first of January and is still upon us, affecting fully two thirds of the population. In some instances the schools have been closed, so many of the pupils were affected. It affects all ages, but is principally confined to males.

"The symptoms are more variable than in previous epidemics. I think I recognize three different forms of the disease. (1) Bronchial, or catarrhal. (2) Febrile, with a second rise in temperature after the drop in several cases. (3) Neuralgic.

"I have seen only one case of supervening pneumonia, and that was in the spring epidemic. I have seen in connection with the present epidemic four cases of herpes zoster, more than I have seen here before in many years. Influenza seems to be a common disease here."

Dr. Lane writes also from Vineyard Haven: "There was no evidence of its being communicated by or from one person to another, even when occupying the same room or bed through severe cases lasting two weeks."

Barnstable County furnishes only one manufacturer's return, and that from a shoe shop at Orleans on the arm of Cape Cod. The first case occurred January 14th, the greatest prevalence was during the fourth week of January, 33% of 66 employees were attacked and absent from work on an average of four days. The return of the doctor at

Orleans, on the other hand, reports the first case as occurring in his neighborhood on December 27th, the greatest prevalence during the first week of January, 33% of the population as affected, males the most severely affected, and pneumonia as increased.

Medical Returns.

From physicians in Barnstable County there are fifteen medical returns from eleven towns, all the way between Truro on the northeast arm of the Cape to Sandwich at the southwest border. At Truro the first case is dated January 1st, and the greatest prevalence the last week of January; from Wellfleet, ten miles away, the first case is reported November 20th, and the prevalence the third week of January; Chatham, December 22d and the second week of January; Harwich, January 1st and second week of January; Brewster about the same; West Dennis, December 20th and second week of January; but South Dennis December 1st and first week of December. Of two reports from Hyannis, one places the first case December 10th, the other December 25th. Of four returns from Sandwich, one places the first case October 6th, two December 20th and one December 27th; one gives the first week of January as that of greatest prevalence, two the second week, and one the third week; one reports 50% of the population of Sandwich as mildly affected and 12% severely, another 30%, and another 25%.

Conclusions.

The greatest percentage of affected (75%) is reported from Harwich, West Dennis and Osterville; the least percentage (10%) from South Dennis; of the two reports from Hyannis one gives 10% as affected, and the other 25%. The average of thirteen towns is 37%.

XUM

Sex.

The only point which can be fairly well established from the Barnstable medical returns is, that males were more severely affected than females, and probably—as one doctor puts it—"because they were more exposed to the weather." Ten out of fifteen report "males," two females, one is doubtful, one says no difference. From Sandwich one return says "males," one says "females," one "rather more females," and one says "no difference." So that, on this point, Sandwich remains in doubt.

Other Diseases.

Six returns from this county report pneumonia as increased, and four pulmonary diseases.

Bristol County.—I have tabulated 13 manufacturer's returns from Bristol County covering about 7000 employees. Of these three are from New Bedford, six from Fall River, three from Taunton—all in the southern half of the county—and one from Attleboro' near the northern border.

The earliest first case, December 14, is reported from Attleboro' at the north, but two mills at Fall River report first cases December 15th; the latest first cases are at Fall River and New Bedford—the southern extremity, but in close railroad communication with Boston—each January 6th; the largest mill at New Bedford, however, reports its first case December 31st, and the third mill January 1st.

The three returns from Taunton agree substantially upon December 30th as the date of the first case. All the returns, except one from Fall River which names the last week of December, agree practically upon the second week of January as the maximum week.

The percentage of affected varies from 60% to 5%, the average being 29%; the absence from work an average of five days.

The superintendent of the Granite Cotton Mill at Fall River writes a letter of some interest under date of February 4th:

"The influenza made its appearance among our people December 27th, the day after the great gale which swept over the Eastern States. December 30th, when the temperature fell from 54° F. to 37° F., the number of victims increased rapidly, and reached a crisis a few days after January 1st, when there was another fall in temperature from 36° to 20°, followed by a cold wave, which those who dressed in holiday attire and engaged in New Year's festivities were not prepared to meet, and the number of victims continued to increase until January 13th, when a large percentage returned to work, and since that time the number of those off work has steadily decreased, and to-day there are only seven cases among 836 employees."

The treasurer of a cotton mill at Taunton, 1200 employees, sends very accurate figures, from which it appears that of 650 males, 221 were sick, an average of 4.73 days; and of 550 females, 259 were sick, an average of 5.95; so that at this mill the females were sick in greater numbers and more seriously.

Medical Returns.

I have tabulated seven medical returns from this county, all from the southern half of the county, except one from Attleboro'. The earliest first case is, December 10th, from New Bedford; the latest first case, December 28th, from Fall River near by. The next earliest case is from Attleboro', at the northern part of the county, December 18th. All the returns, except one, which gives the first week in January, name the second week of January as the maximum week.

The percentage of affected varies from 60% in Attleboro' to 10% in Fall River. Average 33%.

Sex.

Three state that males were most affected, one females.

Other Diseases.

Four returns state that pneumonia was most increased in frequency.

Conclusions.

I think we may conclude from the two classes of returns in this county that influenza was at least a week later here than in Boston (Suffolk County), and that where males and females were equally withdrawn from out-door exposure the females suffered more.

From Plymouth County there are only three factory returns, all three from shoe shops in Brockton and its neighbor Campello, in the northwestern corner of the county. These returns cover nearly 1000 employees.

The answers to question 1 are January 1st, 2d and 10th; to question 2, the 3d of January, the second week and the third week; that the climax was not reached any earlier in the shop where the first case occurred January 1st, than where it occurred January 10th. The percentages of affected were 60%, 20%, and 40%; and the days of absence from work 2, 7 and 5. The sexes are returned as affected alike.

Medical Returns.

There are four from Plymouth County. From Abington the answers to questions 1 and 2 are December 4th and the week from December 29th to January 4th; from Brockton the answers to 1 and 2 are December 20th and second week in January; to question 3 this return gives 50% of the population as attacked. From Middleboro', farther south, the first case is reported as occurring on the same day as at Brockton, and the climax as occurring the same week, but only 10% of the population was affected.

From Rockland, the next township to Abington, the first case is set down for December 22d, eighteen days later

than the first case at Abington; the climax, however, was reached about the same time in the two towns; at Rockland only 6% is returned as attacked.

Three of the four answer the male sex to question 5; two specify pneumonia, and one pulmonary diseases as being increased.

Obviously no definite conclusions can be drawn from the returns from this county.

The case in Abington December 4th was probably antecedent to the true epidemic; and the epidemic perhaps began a little later and culminated a little later than in Suffolk County.

From Norfolk County five factory returns, one silk, one woolen, one cotton, one straw, cover from 1500 to 2000 employees. The earliest first case is December 16th, the latest December 28th; in two returns the climax is reached the first week in January, in two the second week in January, in one the week January 4 to 11.

The silk factory reports 60% of affected and of absentees an average of 5 days; the straw factory 50% of affected and 20% of absentees, an average of 3 days; the woolen mill 15% of affected and 10% of absentees, an average of 4 days; the cotton mill 6% of affected and 3% of absentees, an average of 3 days. The first case at the woolen mill in Dedham was December 16th, and the first case at the cotton mill at Readville in the next township was December 25th, but the period of greatest activity at each was the first week in January.

Medical Returns.

There are thirteen from Norfolk County, representing twelve different towns. West Medway at the western border of the county reports a first case as early as October 20th—evidently a sporadic case of catarrhal fever; Hingham

near the coast, and just north of Abington with its first case December 4th, reports its first case November 15th; 12 "distinct cases" are reported as occurring in Brookline November 17th—perhaps a local outbreak; Stoughton, on the southern border of the county and contiguous to Brockton with its first case December 20th, reports a first case November 20th; Dedham's first case is returned for December 12th; of two returns from Hyde Park, one gives the first case as December 7th, the other December 27th; the Medical Examiner at Brookline gives the date of the first case there as December 15th; the first case at Foxboro' is the latest—December 25th. East Weymouth gives December 21st; Braintree and Randolph (next to Stoughton with its first case November 20th) give December 20th. Eight towns return the first week in January, or the week from December 28th to January 4th, as the week of greatest prevalence. Two towns, West Medway with its first case October 20th, and Hingham with a first case November 15th, report the second week of January as the week of greatest prevalence, which indicates pretty well the character of the so-called first cases. The return from Hyde Park which dates the first case December 7th, puts the climax at the fourth week of December; that from Quincy which dates the first case December 1st, puts the climax the first week in January, the same week as those dating the first case December 20th. At Braintree and Wellesley Hills 75% of the population is said to have been attacked; various percentages are given for the other towns between this and 20% for Hingham and 15% for Brookline at the other end of the scale. The average is 51%.

Sex.

Eight returns from as many different towns specify the male sex as having been most severely affected. The others make no return to this question, except one which states that the female population was the larger.

Medical Returns.

Seven returns state that pneumonia was increased, and three others that pulmonary diseases were increased. One return mentions capillary bronchitis in connection with pneumonia.

SUFFOLK COUNTY, the next on the north, is really the City of Boston with Chelsea; from the small towns of Revere and Winthrop, also within the county limits, there are no returns.

There are seven returns from the large Boston dry goods stores. One places the first case as early as December 1st, but reports the same week of greatest prevalence (December 28th to January 4th) as another store which reports the latest first case of the seven, December 22d. Two date the first case December 10th, one December 16th, one the 20th. Four give Christmas week as the climax, but this is partially explained by one return which says: "Our employees were lightly touched, and there were no more absences than usual at Christmas time which is always the cause of much fatigue." Two stores return 50% of employees as affected and 45% as absent in consequence; one returns 50% as affected but only 5% as absent—a singular discrepancy; one, 33% as affected and 25% absent; one, 10% affected and absent. The average duration of absence varied from 2 to 7 days. Two stores report the male sex as most seriously affected.

There are returns from nine banks and Trust Companies. Among the personnel of two banks no case of influenza occurred. One dates the first case December 10th, one December 13th, one December 16th, one December 17th, one December 20th, and one the 27th. The large banking house with 44 employees reporting its first case December 13th, gives the second week of December as the week of greatest

prevalence; 60% were attacked and 45% were absent—an average of four days. If this is a correct statement, and there is every reason to accept it, it indicates that the epidemic exhibited an almost explosive character at this point.

A Trust Company, with 26 officers and clerks, dating its first case December 17th, gives the immediately following week as that of greatest prevalence.

Two banks report 75% of affected with 25% and 20% of absentees; one, 50% with 33% absent; one, 33% affected and absent; one, 25% affected and absent. The average of absences varied from three to six days.

At the Trust Company with 26 employees, three had a second attack incapacitating for work; and "the oldest" of the staff are reported to have had immunity.

These bank returns, dealing with comparatively small numbers under immediate supervision, are probably pretty reliable. They indicate that the influenza began as an epidemic in Boston about the middle of December and was on the wane by January 4th; that at least 50% of the young and middle-aged male population was attacked, and that about 25% was incapacitated for work for four or five days.

The return of the Central Boston Post Office, where there are 472 employees (clerks), dates the first case December 15th, and the week of greatest prevalence December 28th to January 4, which corresponds pretty accurately with the hospital and medical returns; 29% were said to be affected, 22% were incapacitated and absent an average of four days; male employees were most severely affected, but only 25 women are employed.[1]

[1] In response to my request, separate returns were made up for the letter carriers, 155 in number at the Central Station, who were naturally more exposed in the open air than clerks in the building. The week ending December 10th, a daily average of 6.34% were absent from duty, December 19th, 6.14%; December 27th, 6.64%; January 4th, 10.32%; January 12th, 11.67%; January 22d, 9.48%; January 30th, 10.19%; February 8th, 10.44%. The percentage of daily absentees nearly doubled from the week ending December 19th to that ending January 12th. The maximum week was apparently a week later than among the clerks.

The North End Station of the Boston Gas Light Company employs 320 men, and dates its first case December 27th, and its week of climax is given as the first week in January; 55% were attacked and 18% absent an average of three days. The Superintendent writes a somewhat interesting letter, to the following effect:

"At the South Boston works, where thirty men were employed, the first case appeared December 28th, and it prevailed unceasingly the first three weeks in January; 64% of all men were attacked, and all were obliged to leave work about four days. The last case was cured January 24th. Men who worked at the fires and were subjected to heat and chill, and men of sedentary habits were attacked. Every man in the retort houses and all the office men had it, while only one street laborer, and none of the yard men were attacked."

The Whittier Machine Company of the Roxbury District, employing 261 men, presents a singular return: its first case was December 22d, the week of climax the first in January, only 4½% were attacked and only 2½% absent an average of seven days. The Chelsea Dye House had its first case December 5th, its maximum week the fourth week in December, 40% of its 92 employees were attacked and 35% absent an average of seven days.

The average percentage of affected in eight mercantile houses in Boston, employing males, almost exclusively, is 50%.

Medical Returns.

There are twenty-three from Suffolk County—all from Boston except one from Chelsea—which I have tubulated.

One first case is reported December 1, one December 5th, three December 12, but in each of these returns the maximum week is given as the last week in December. The Chelsea return dates the first case as late as December 25th and the maximum week the first week of January.

The latest first cases returned from Boston proper are those dated December 20th. The greatest number of returns (five) giving the same date for the first case are for December 17th, and there are three giving December 16th. It would be fair to assume the middle of December as the date of the beginning of the epidemic in Boston. Ten returns give the last week of December as the maximum week, three the week from December 28th to January 4th, and three the first week of January. It is probably fair to assume that the epidemic began to decline in Boston about the end of the first week of January.

It took, therefore, ten or twelve days to reach its climax, where it held probably five or six days.

One return from Charlestown District gives 80% as the proportion of the population attacked, one from Brighton 75%, one from Roxbury 70%, two from Boston proper 65%, two 50%—these must be estimates or guesses. One return says 44% of persons in families visited, one 25% in families visited. The lowest percentage from Boston proper is 20%, and the lowest of all, from Chelsea, 17%. The average is 44%.

Sex.

Of those answering question No. 5 as to sex, five say male, three female, one "happened to be female in my practice."

Other Diseases.

Twenty-three state that pneumonia was increased (one specifying fibrinous pneumonia); one states that pulmonary diseases were increased; one mentions gastritis; only one specifies insomnia as a complication. In the practice of one there was a general immunity from other diseases during the latter part of the epidemic. The mention of bronchitis is so usual in all these returns that I omit it.

As to the question of sex or exposure in the open air, two

correlated factors as it seems to me elsewhere, it is difficult to draw any definite conclusions from the medical returns of Suffolk; but it is pretty evident that pneumonia was increased.

Essex County.—Extending along the coast and immediately to the north of Suffolk, I take up Essex County next.

I have tabulated 16 returns from manufacturing companies, etc., in this county, and 21 medical returns from 14 different towns.

A Lynn shoe shop (the only one reporting on account of the fire), with 210 employees, reports its first case January 1st, and its maximum week the second in January; the first case at the Lynn Bank was December 28th.

From Beverly, two shoe shops, each employing about 300 men, report. One says its first case was "about November," its maximum week the second week of December, 90% of the employees were affected and 75% were absent an average of ten days. The other reports its first case December 20th, its maximum January 1st; 50% were attacked and absent an average of four days. These shops are very near each other, and it is impossible to reconcile the two statements unless we explain the first by a "strike" rather than by influenza.

From Salem, a Bank reports its first case December 21st; five out of six were affected; but the Naumkeag Cotton Mills at Salem, with 1078 employees, reports the first case "about January 1st," the maximum week January 4 to 11, 40% attacked, 13% absent an average of five days. The Ipswich Cotton Mills, 552 hands, same date for the first case, January 11 to 18 for the maximum. Two mills at Newburyport, employing together 580 hands, report first cases January 3rd and 4th, maximum weeks January 4 to 11 and the second week of January; 25% and 43% of affected and absent an average of seven days.

XUM

A Haverhill shoe shop, with 400 employees, reports its first case December 20th, its maximum week December 28th to January 4th, 75% affected, 25% absent. From Lawrence there are two returns. Of the Great Pacific Mills, with 4336 employees, very full, accurate and reliable returns may be found in the Boston Med. and Surg. Journal, Vol. cxxii. p. 251, to which reference will be made later.

The first case at the Pacific Mills occurred December 24th, the maximum week was January 4th to 11th, 40% were affected and absent an average of 6½ days, females were the most and the most seriously affected.

The Pemberton Cotton Mills of Lawrence, with 676 employees, report the first case December 17th, the maximum week January 4th to 11th, 41% were affected (lost time in consequence) and out an average of $5\frac{4}{10}$ days; females were most attacked, 49% of the females and only 29% of the males. The report from this mill also is apparently accurate and reliable, and agrees in the main with the Pacific report.

A linen mill at Andover, 308 employees, reports first case December 14, maximum week second week of January, 41% attacked, 38% out. A machine shop at North Andover, 421 hands, all males, December 25th, January 5 to 12, 40% attacked and out five days.

Medical Returns.

One return from a coast town (Newburyport) and one from an interior town (North Andover) date the first case December 1st; but the return from Andover, next to North Andover, dates the first case December 21st, and gives the maximum week as the second week of January, and the other return from Newburyport names January 1 to 15 as the maximum period, so that these early cases may be considered sporadic as similar ones have been in other counties.

The latest returns of first cases are from Marblehead and Manchester on the coast and Methuen in the interior, all

January 1st; the maximum week at Methuen is given as the third in January, at Manchester January 5 to 11.

Lynn returns December 15th; Peabody December 10th, with a maximum in the second week in January; Danvers one return December 15th, one December 25th, with the third and second weeks of January as maximum weeks respectively; Gloucester December 18th and 24th, both returns naming January 5 to 11 as a maximum week; Haverhill December 20th and 28th, with the first and second weeks of January respectively as maximum weeks.

West Newbury next to Newburyport gives December 16th as the date of the first case.

Lawrence December 20th, December 20th, December 23d, with the first week of January as a maximum week for the first two, and January 7 to 21 for the third return.

Georgetown, in the northwestern corner of the county, gives December 16th as the date of its first case, and the middle of January as the maximum period.

The percentages of population attacked range from 80% in Marblehead to 5% from one return from Haverhill, the other return from Haverhill giving 33%. One return from Danvers gives 60%, the other 10%; one return from Lawrence gives 50%, one 25% and one 12%. The return from Andover says 50%, that from North Andover 15%. The average of twenty returns is 38%.

Sex.

Eleven returns specify the male sex in answer to question 5; three returns say females, but in one of these the practice is among females.

Other Diseases.

Eleven returns state that pneumonia was increased, three specify catarrhal and one croupous pneumonia. Four state that pulmonary diseases were increased. Two mention gastro-intestinal disorders as complications. A Medical

Examiner reports two deaths without treatment, "probably from congestive pneumonia." One return from Lawrence states that influenza "drove out" diphtheria which had been prevalent.

MIDDLESEX COUNTY.—This county, lying next to Essex and Suffolk, brings us back from the northern border of the State to the neighborhood of Boston. It is almost wholly an interior county, and, except for a small though thickly-populated territory around Boston, we take leave of the immediate influence of the sea. It is a manufacturing population. I have tabulated 27 returns from factories, banks, machine shops, &c.

From Lowell, in the northern part of the county, seven returns cover nearly 9,000 employees. The Lowell Cotton Mills, with 1,736 employees, report the earliest first case December 20th, with a maximum week the same as that in Boston, viz.: December 28th to January 4th. The Merrimac Woolen Mills report the latest first case January 10th, with a maximum week the second week of January; there are three first cases December 26th; one, December 30th; two, January 1st: four mills give the second week of January as the maximum week, two mills January 4th to 11th, one and the Bank (only five employees) December 28th to January 4th.

The percentages of the affected and absent, at the mills in Lowell, varied very much, according to these returns, from "nearly every one" affected, and 50% absent an average of four days at the Merrimac Cotton Mills and Print Works, to 10% affected and 8% absent an average of four days at the Merrimac Woolen Mills. The favorable return, if accurate, from the Merrimac Woolen was probably due to something other than wool, for the Middlesex Woolen Mills report 50% affected and 20% absent an average of five days.

The different departments of the same mill were as differently affected as the different mills. To this point I shall revert again later. Five days was about the average of absence from work.

Sex.

As far as the Lowell returns offer any reliable information upon that point, the female sex was the most affected. Careful calculations from the Merrimack Cotton, with 3200 employees, in answer to a personal request, show that influenza "was more prevalent among women and boys than among men."

The Pepperell Cotton Mills, 316 employees, in the northwestern corner of the county and somewhat off the main line of travel though with railroad connection, report the first case January 9th, and the maximum week the third week of January.

The North Billerica Cotton Mills, nearer Boston than Lowell and on the main line of travel, with 265 employees, report the first case "about January 1st," and the maximum week the third week in January. Next to the south, a tannery at South Woburn, 180 employees, has its first case October 4th, its maximum week the second week in October, 6% attacked and 5% absent an average of thirteen days—evidently a local predecessor of the great epidemic, for a Winchester factory a few miles away and still nearer Boston reports its first case December 26th, its maximum week the first week of January. The Malden Rubber Shoe Company, 1255 employees, with dates agreeing pretty closely with those previously recorded in Suffolk County, had only 15% attacked and 12% absent an average of five days. The returns from manufactories in Cambridge, Watertown, Waltham, Newton, covering 4200 employees, vary but little from those given for Suffolk County, but the first cases are a few days later and the maximum weeks a few days

later. The Nonantum Worsted Company at Newton, 520 employees, reports its first case December 30th, its maximum week January 4 to 11, 17% of affected and absent an average of five days.

The Waltham Watch Works, 2300 employees, reports males as most affected. Returns from two shoe shops at Marlboro', 1100 employees, report first cases December 22d and 26th and the maximum week the first week of January and January 4 to 11; from woolen mills at Maynard, 886 employees, the first case was December 20th and the maximum week January 4 to 11, Marlboro' and Maynard are in the western part of the Middlesex near the Worcester line.

Medical Returns.

I have tabulated 26 medical returns from this county. Beginning again with Lowell near the northern line, there are two returns, one placing the first case December 10th and the maximum week the second week of January, the other December 21st. Billerica returns the first case December 12th and the maximum week the second week of January; from Ayer in the northwest, near the Worcester County line, the Medical Examiner of the District, Dr. Hartwell, returns the first case as December 21st and the maximum week the second week in January. He writes: "I go into four or five adjoining towns. Ayer is a large railroad centre. The epidemic began here and reached its height from one to two weeks earlier than in places off the line of travel, and, as far as my observation goes, affected a larger number of the inhabitants.

"The only case I saw as Medical Examiner was one in Pepperell, said by the neighbors and thought by Selectmen to have died from influenza, but proved on examination to have died of acute alcoholism."

Returns from towns around Boston—Somerville, Med-

ford, Melrose, Arlington, Cambridge, Waltham, Lexington, Concord, Newtonville, Newton—though varying considerably in the dates of first cases, and still more so in different returns for the same towns (Cambridge, for instance, returning November 15th, 24th, December 1st, 23rd, as dates of the first case), agree on the average with the Boston returns, as do those also of the date of the maximum week. Returns from Framingham and Hopkinton in the southwestern corner of the county agree as to dates with those from Boston.

The percentage of the affected varies from 75% in five returns to 10% in two returns. It also varies within these same limits for different returns from the same place. The return of the Medical Examiner resident at Somerville estimated 75% of the population attacked, another return from Somerville names 10% as proportion. The average percentage of 24 returns tabulated is 44%.

Sex.

Fifteen returns specify the male sex as suffering either most numerously or most severely. Of these, one reads: "Males who were most exposed to weather and hard work"; one return says: in numbers females suffered more; in severity, sexes alike; one return says: more cases among females, more complications among males; one return says: females more frequently attacked, in the proportion of 3 : 2.

Other Diseases.

Eleven returns state that pneumonia was increased, and eight that pulmonary diseases were increased; one return states that there was less pneumonia than usual; one reply affirming an increase of pneumonia expresses doubt whether "the pneumonia had any direct connection with the influenza, or whether it was an independent disease attacking those already debilitated"; and another reply is accompanied by

this comment: "Most cases of so-called pneumonia following influenza are in reality cases of congestion, not croupous pneumonia." Another return states: "no diarrhœa, no constipation, no diseases increased in frequency or severity."

A member of the Board of Health of Lowell writes: "Scarlet fever, which had been rapidly increasing for four weeks, with the first week in January (the maximum week of influenza) suddenly decreased, and the same is true of diphtheria, though in a less degree." This coincides with a return from Lawrence previously alluded to.

WORCESTER COUNTY.—This county occupies the heart of the Commonwealth and stretches across it from north to south. Though studded with manufacturing towns, it has a larger agricultural population proportionately than the counties previously considered. It may be regarded as a more homogeneous area than such counties as Barnstable or Bristol or Essex or Middlesex. I have tabulated 27 returns from manufacturing companies, banks, &c., covering 11,405 employees.

The returns indicate that the epidemic affected Worcester County in general later than those counties we have already gone over to the east of it. The earliest first case is returned from Clinton, the Bigelow Carpet Works, December 16th, but the maximum week was the second week of January, and the Lancaster Mills at the same place reports the first case December 26th, with the same maximum week; West Upton reports a first case December 21st, but as a maximum week the third week in January, and a factory in the contiguous town of Grafton reports its first case January 9th, with the third week of January also as the maximum week. A shoe shop in Worcester reports a first case December 23d, and a maximum week January 4th to 11th; but the first case at the Bank which reports was December 30th, and at the Loom Works, 500 em-

ployees, January 1st; a Worsted Company in Fitchburg reports its first case December 20th, but its maximum week the second week of January; and another company in Fitchburg dates its first case January 1st, and its maximum week the third week of January. Fourteen first cases are dated between January 1st and 10th, and the others in the last days of December. Eight returns give the third week of January as the maximum week, and fourteen the second week; one gives the fourth week.

The percentages of those attacked vary from 60% to 5%, and of those absent from work from 60% to "very few"—that is, less than 5%.

The Cotton Manufacturing Company of West Boylston, with 226 employees, reports "only one case and that early in January." The average absence from work was between five and six days.

Medical Returns.

I have tabulated 16 medical returns from 13 different towns. The earliest first case, December 15th, is from Grafton, where the manufacturing company dated its first case January 9th, but the maximum week was the second week of January. Five returns—one each from Westboro', Worcester, Clinton, and two from Fitchburg—date the first cases December 20th; the other returns vary from December 22d to January 3rd—this latter another return from Fitchburg. Ten returns name the second week of January as the maximum week, and four the third week.

The estimates of the percentage of population affected vary from 90% to 10%. Of two returns from Worcester one says 90% and one 50%; of three returns from Fitchburg one says 65%, one 25%, one 10%; the Medical Examiner at Gardner, near Fitchburg, estimates 80% for his district. The average is 48%.

Sex.

Twelve reply males, and two females.

Other Diseases.

Twelve say that pneumonia was increased, one that pulmonary diseases were increased, and one that whooping cough was more fatal.

The next belt of the State to the westward may be regarded for our purposes as made up of three counties, Hampden, Hampshire and Franklin—in that order from south to north. The centre of these counties is traversed by the rich farming lands of the Connecticut River Valley, and the abundant streams from the hills are utilized for manufactures.

HAMPDEN COUNTY.—I have tabulated twelve returns from factories and banks in this county, employing between four and five thousand people. A Springfield Bank and a Holyoke Bank (the only banks sending returns) report "no sickness"; the Holyoke Blanket Company reports, "few sick at any time and did not interfere with work"; and the Germania Mills (Cotton), Holyoke, report "no loss of time from influenza"; but two thread companies at Holyoke report first cases December 24th and 26th, and the second week of January as the maximum week. A Firearms Manufacturing Company at Springfield, 213 employees, reports its first case January 1st, its maximum the second week of January; 10% affected, 5% absent an average of nine days.

No return from this county gives any earlier maximum week than the second week of January; but there is a report of a first case from near Palmer, December 18th, one from Ludlow a little farther west, December 20th, one from Chicopee—again a little farther west—December 24th, but the other return from Chicopee gives January 1st as the first case.

There are some apparently more than usually accurate and interesting returns from a Duck Company at Palmer in the eastern part of the county, employing 325 hands. The first case in the dressing shop is reported December 30th, and the maximum week the second week in January; but the first case in the Bleaching Department did not appear until January 7th, and the maximum week in that department was the 4th week of January. In all the departments, except the dressing, the first case was some time during the first week of January, and the maximum week was in seven departments the second, in one the third, and in one the fourth week of January. In the Bleaching 87% were affected and 75% absent an average of five days; in the Dyeing 80% were affected and 35% absent an average of 6 days; in the Iron Repair shop 75% were affected and absent 7 days; in the Weaving 66% were affected and absent an average of 6 days; in the other departments there were considerably less, and least, with 25% an average of 4 days, in the Spinning.

Medical Returns.

I have tabulated thirteen medical returns from eight different towns in Hampden County. The dates given for first cases range all the way from October 6th in Monson at the south-east extremity of the county, to December 26th at West Springfield and Holyoke in the north-west, and are so varied and unreliable that no conclusion can be based on them. One return from Palmer gives the date of the first case December 1st, but states that influenza did not become general until after Christmas. This agrees with the factory returns and is probably the true interpretation of the medical returns; the maximum weeks given indicate the same thing; as do three different Holyoke returns dating first cases December 1st, December 20th, December 26th, but all giving the first week of January as the maximum week.

Seven returns name the second week of January as the maximum week, five the first week, one the third week. The percentages of affected vary from 75% to 20%, and the average of eleven returns is 44%. One practitioner profited, apparently, but little by the epidemic, as he reports that only one-fourth of 1% among his clients were affected.

Sex.

In this county eleven returns state that males were most affected. One return says: "especially out-door laborers"; one says: "male, those out-doors"; one says: "the careless, and those who tried to keep going every day about their business and work."

Other Diseases.

Eight returns state that pneumonia was increased and one that pulmonary diseases were; three (one from Springfield and two from Holyoke) report malarial complications; one return from Holyoke says it resembled "dengue."

Dr. A. F. Reed, of Holyoke, writes: "Bronchitis was common in most cases, but the most prominent influences seemed to be a union of rheumatic and malarial forces in a hybrid action, and in my experience quinine failed to give as good effects as salicin."

HAMPSHIRE COUNTY.—From this county I have tabulated thirteen returns from manufacturing companies, employing about 4,000 people. There is one return of a first case, "about December 1st," one December 9th, one December 13th, one December 15th; but the maximum week in all of these returns is the second or third week in January. A factory in Northampton reports its first case January 1st and its maximum week immediately thereupon—the first week of January; but the first case at the Northampton Bank did not occur until January 5th. A silk com-

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pany at Florence reports the first case December 9th; but a braid company at the same place reports its first case January 6th and its maximum week the second week of January; the same maximum week as that given by the silk company. From the silk mill 20% were affected and absent an average of eight days, and from the braid mill 25%, an average of four days. Eight returns give the first case between December 25th and January 7th; nine returns name the second week of January as the maximum week, and three the third week. The percentages of those absent from work vary from 60% to 5% and the time about six days.

Medical Returns.

I have tabulated eleven medical returns from seven different towns in Hampshire County. The dates of first cases vary from December 15th to January 1st. From Ware three returns date the first case December 20th, 27th, 28th. From Northampton three returns date the first case December 15th, December 18th, December 29th. One return names the first week of January as the maximum week, but all the others name the second week. One Northampton return gives 10%, one 25%, and one 75% as the proportion of the population attacked. One Ware return says 10%, one 33%, and one 40% as the proportion of the population affected. The Easthampton medical return says 60% of the factory employees, but 40% of other population. The average of ten returns is 39%.

Sex.

These returns throw little light on sex. One return says, both sexes were most affected.

Other Diseases.

Six returns say pneumonia was increased, one specifying lobular pneumonia. One return from Northampton says:

"there was no pneumonia, and all other diseases appeared to be abolished; there was one death from delirium." In regard to this Dr. Seymour, Medical Examiner, reports the following:

"A man, 32 years of age, had influenza at his home in Springfield. He got out of bed, dressed and came to his parents' home here in a state of delirium. He left their house at 2 A.M., and was found wandering about the streets by a policeman, who took him to the station house. There he remained in a wild delirium until 8 A.M., when, as he became silent, the keeper went to visit him and found him dead. I viewed the body and these were all the facts I could ascertain."

FRANKLIN COUNTY.—This county, the most northern of the three occupying the breadth of the State, is somewhat less thickly settled and less traversed by railways than the two preceding. The manufacturing returns are scanty, and I have only tabulated one as apparently accurate.

The Russell Cutlery Company at Turner's Falls, at about the centre of the county on the Connecticut River, returns its first case January 6th, its maximum week the second of January, and 33% of its employees were affected and absent an average of 6 days.

Medical Returns.

I have tabulated five medical returns from five different towns. Three returns from the eastern part of the county, from Orange in the centre, Cooleyville at the south and Northfield at the north, give the first cases December 26th, January 1st and December 23d respectively, and the maximum weeks as the second for the first two, and the third week of January for the last respectively. The medical return for Turner's Falls reports the first case December 26th, the return for Shelburne Falls farther to the west reports

the first case November 15th; both of these returns name the second week of January as the maximum.

The percentage of populations affected according to these five returns varies from 75% to 50%, the average is 66%.

Sex.

Three returns state that males, and one that females suffered the more.

Other Diseases.

Two returns state that pneumonia was increased.

BERKSHIRE COUNTY.—This county occupies the extreme western belt of the State from south to north. It also is less thickly settled than other counties, and communication between many townships is less immediate and direct than is the case in some of the other counties. There are, however, a good many manufactories within its borders.

I have tabulated returns from 16 factories, employing nearly 5000 people. A company at Housatonic in the southern part of the county, and one at Adams in the northern part, return the earliest first cases, December 25th and December 30th respectively; the maximum week for the former being the first, and for the latter the third week of January. Seven first cases are dated January 1st, two January 6th, one January 7th, one January 8th, one January 15th, one January 18th. One return names the first week of January as the maximum week, four the second week, nine the third week, and one the fourth week. No conclusions as to sex can be drawn from returns in this county. One return says "neither or both."

The percentages of the affected vary from 75% to 5%, with an average of 45%, and of those absent from work from 50% to 3%, with an average of 22% for an average of 5⅔ days.

The Arnold Print Works at North Adams reports "the epidemic did not cause any serious annoyance" among its 146 employees. This is striking, for of the two other manufactories reporting from North Adams one had 50% of its employees absent an average of six days, and the other 25% an average of four days.

Medical Returns.

I have tabulated 16 medical returns from nine different towns in Berkshire County. I am obliged to conclude that they are not of much value in determining the time when influenza assumed an epidemic character in this part of the State. The dates of first cases vary all the way from October 14th at Montville to January 8th at Otis, neighboring towns in the southeastern corner of the county. At Montville the maximum week is reported to have been the third week of November! Evidently again a local outbreak. Two returns from North Adams each give December 15th as the date of the first case, the second week of January as the maximum and 50% as the percentage of population attacked. Of three returns from Williamstown, next to North Adams, two date the first case January 1st, and one December 19th; the maximum week of one of the first two and of the last being the second week, the maximum week of the other being the third week of January. But the returns from Pittsfield are still more perplexing: of five returns, one dates the first case November 20th, one December 15th, one December 17th, one December 27th (this return mentions having seen a case November 27th), one January 5th, and the maximum weeks vary almost as much. From Sheffield in the southwestern corner of the county the first case is reported December 15th, but the maximum week did not arrive until the fourth week of January.

The percentage of population affected vary from 87% to 10%, with an average of 60%.

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Sex.

Eight returns state that males, and three that females were more affected; one return says: "men complained the most, because it was their nature to, but women were really as sick."

Dr. S. C. Burton, Chairman Pittsfield Board of Health, writes January 26th:—"In our House of Correction, of which I have medical charge, there were 105 prisoners; of these 96 males, 9 females. Ventilation to the male prisons by windows on the North and South side, to the female prison by windows on the East and West side. The windows in the male prison were open most of the time. The hall man was the first taken sick January 11th, the following day 24 men were sick, the next morning eight were too sick to go to the shop. January 14th twenty more were taken sick, and one or two a day afterwards until the number reached 56, all males—not a single case in the female prison."

Other Diseases.

Nine returns state pneumonia was increased; two that pulmonary diseases were increased; one that capillary bronchitis was increased.

SUMMARY OF GENERAL CONCLUSIONS.

Some of these returns are evidently quite accurate, and some mercantile returns and those of some public institutions, as well as a much smaller proportion of those of physicians, are based upon carefully kept records; other returns are only approximately correct; and still a third and not small class are mere guesses, which gain such value as they possess from the probability that the errors counterbalance each other.

In drawing conclusions I have considered the date of

maximum weeks of more importance than the dates of first cases.

The data furnished for Suffolk County by such sources as the Massachusetts and City Hospitals, the State Prison, the Post Office, the two large private banks quoted, are probably pretty accurate; as are the returns from the Pacific Mills (Cotton and Prints) Lawrence, Essex County, 4200 employees, and from the Pemberton Cotton Mills at the same place, and from the Merrimack Mills (Cotton and Prints) Lowell, Middlesex County, 3200 employees, and from the Bigelow Carpet Mill, wools, Clinton, Worcester County, 1050 employees; and from the Palmer Duck Company, Hampden County, 325 employees.

From these, collated with the mass of less evidently reliable returns which I have tabulated but not read, one may, perhaps, conclude that:

I.—Influenza appeared first in epidemic form at Boston and its immediate vicinity; that the epidemic dates there from the middle of December, although there were sporadic cases earlier; that it culminated during the week between December 28th and January 4th; that it began to decline pretty rapidly from that date, although its after effects still exhibit themselves in many forms.

II.—That the epidemic was from ten days to two weeks later at the Island Counties (Nantucket and Dukes) than at Boston; that it was about a week later in Barnstable and Bristol Counties; and a few days later, perhaps, in Plymouth and distant parts of Norfolk Counties.

III.—In the northern parts of Essex and Middlesex counties the epidemic was from five days to a week later than at Boston. Most of the towns reporting in these counties—especially in Bristol, Essex and Middlesex—are in constant, rapid and easy communication with Boston by frequent and crowded daily trains.

IV.—It is difficult to explain why these counties were

attacked later than Suffolk, and at the same time why Nantucket and Dukes were attacked still later than these counties. Neither a miasmatic wave, nor contagion, nor yet the two combined—as we understand them—cover all the observations.

V.—The epidemic, apparently to some extent, radiated out from Boston as a first centre. That it behaved in the same way with regard to the surroundings of other centres of population—notwithstanding the suggestive report of the Medical Examiner at Ayer Junction, and notwithstanding similar propositions made elsewhere—I cannot satisfy myself from these returns. Except as a larger centre of population it is not apparent why Boston should have been attacked before other points as far east on the coast; as a centre of population it is not apparent why it should have preceded New York; and neither geographically nor as a centre of population why it should have anticipated London.

VI.—With many puzzling local variations, backward and forward, and many contradictions, the returns indicate a later development as we proceed westward in the State, until in Berkshire County we find the epidemic developed fully two weeks later than in Suffolk; several days (4 to 5 days) later than in Worcester; and about as much later than in the two Island Counties to the extreme east.

VII.—To judge from the returns of public institutions and of manufacturers, at least forty per cent. of the adult population was seriously enough affected to have occupation interfered with. The medical returns, which necessarily are often guesses, agree with this. A considerably larger percentage probably was attacked.

VIII.—The returns from two maritime counties indicate that exposure to atmospheric influences was an important factor, and men were more affected. On the other hand, where men and women were equally confined within doors by their work, as in mills, the women were both more seriously and more numerously affected.

IX.—Returns from the McLean Asylum, the Massachusetts Hospital, the Boston Children's Hospital, the Tewksbury Almshouse, indicate that officers and nurses were more attacked than patients, an observation which corresponds with others elsewhere, here and in Europe.

X.—In studying the returns of different mills one meets with singular cases of immunity from or predisposition to the epidemic. It is a curious anomaly, that one cotton mill should have less than half of one per cent. of its employees affected, and another 60%; that a silk mill should have 60% affected, a woolen mill in a contiguous township 15%, and a cotton mill in the next township 6%. The percentage of affected at several of the woolen mills is quite small, but this is not invariable, at others it was as high as 40%.

At Print Works there was a great variation in the percentages in different departments. From the Merrimack Manufacturing Company of Lowell, which kindly sent me special figures, I learn that the "departments having a hot, moist atmosphere were subject more severely to the effects of the disease, which was also more prevalent among the women and boys than among the men. The high percentage of the color shop (16%) was due more to the unhealthy nature of the room (which is cold and very draughty) than to the noxious influence of the chemical fumes. Such places as the print room (one case out of 55), indigo dye house (no case out of 20), laboratory (no case out of 12), where the fumes from the drugs and chemicals are most conspicuous, were, comparatively speaking, free from any attack by the epidemic."

At the paper mills, where many operatives are exposed to a warm, moist atmosphere, the percentage of affected was, as a rule, low. How far this was accidental, or how far due to chloride of lime or other materials used in bleaching, may be queried. At the bleacheries of Print Works

about 30% were attacked. At the bleaching room of the Palmer Duck Company 87% of the employees were attacked.

The Arnold Print Works at North Adams reports that the epidemic "did not cause serious annoyance"; whereas the Greylock Mills (woolen) at the same place reports 75% attacked, and 50% absent from work an average of 6 days.

The Merrimack Print Works (all departments included), Lowell, had 18% affected; the Pacific Mills Print Works, Lawrence, had 29.50% affected; the American Print Works, Fall River, had 33% affected.

XI.—Pneumonia was undoubtedly much increased in frequency during the influenza period all over the State. As to the character of the pneumonia—whether lobular or lobar; croupous, fibrinous or catarrhal; whether mistaken for capillary bronchitis—these returns give little information, and one must consult special papers—such as those read April 17, 1890, before the New York Adademy of Medicine by Drs. F. C. Shattuck, E. G. Janeway and William Pepper.

XII.—Some of the returns indicate that the presence of epidemic influenza was inimical to ("drove out") other forms of disease—as diphtheria and scarlet fever.

In the Connecticut River Valley, as might have been anticipated, it seems to have taken a malarial character.

XIII.—To fit the mode of progression of the atmospheric disease wave—if the epidemic was dependent upon a miasmatic poison—with recorded observations in Europe and America, will tax the utmost ingenuity of the scientific meteorologist.

XIV.—The epidemiologist will be quite as much perplexed if he seeks to explain all the phenomena by contagion.

I have endeavored to collate carefully returns as made, and to follow honestly where they seemed to lead without prejudice and without regard to previous mental predispositions. When the returns seemed to offer no exit I have said so. Some errors have doubtless crept in, and some obvious lessons may have been overlooked. The picture, however, has not been varnished at the expense of truth.

The results are meagre enough, but they have yet to be compared with others before we quite despair of reaching some definite knowledge of epidemic influenza. The bacteriologist has failed to help us, and we must still struggle with the intricate problems presented without the aid of a specific micro-organism.

Under date of January 5, 1890, Hirsch, the distinguished Berlin epidemiologist, writes in answer to the editor of the Deutsche Medicinische Wochenschrift:

. . . . . "I am persuaded that the present epidemic differs in no essential particular from those hitherto described. The great interest which the outbreak of this disease has excited is to be explained simply by the indifference of the great mass of the medical public to every thing taught by history. . . . . .

"Whatever I had to say about Influenza I have said in the second edition of my historico-geographical pathology, and nothing new has presented itself."

ARTICLE III.

SOME OF THE RELATIONS OF CLIMATE TO HEALTH AND DISEASE.

By W. EVERETT SMITH, M.D.
OF BOSTON.
Committee on the Distribution of Diseases.

READ JUNE 11, 1890.

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SOME OF THE RELATIONS OF CLIMATE TO HEALTH AND DISEASE.

LIVING as we do in a constant atmospheric bath, it behooves us to know something very definite if we can of its relations to the physical conditions of our bodies. To consider the relations of this bath to our respiratory organs alone is to discuss a portion only of our subject. Yet I know of no attempt to discuss the matter adequately, although many partial discussions have laid claim to be complete and exhaustive treatments of the subject. Nor is it possible in the brief time here allowed to do more than to clear away some of the deep fogs and to outline the barest statement of such beliefs as our daily observation proves are founded upon facts.

Diseases have been too often regarded more as entities with a single exciting cause than as progressive tissue changes with many exciting causes, that are revealed to us moreover not by *à priori* reasoning but by symptoms. The influence of the weather upon disease has been exaggerated; we have not yet established logical and scientific indications for preferring one climate to another,[1] and the result has been that our experimental attempts to find an ideal climate for a given disease have been at times disastrous rather than helpful to the patient.

ABSOLUTE HUMIDITY.—Let us begin with the consideration of Humidity. Nearly every argument upon this

[1] Although we know, for example, that a wet soil favors disease, there are reasons for believing that this is not in itself a law governing disease but only a particular instance of distribution under some general law yet unknown.

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subject is based either upon the definite statement or else the assumption that the absolute humidity of the air (the weight, in grains, of aqueous vapor per cubic foot of air) is dependent upon temperature. It is nothing of the kind.[2] At all temperatures, even the lowest, there is a process of evaporation going on, modified by many varying conditions, among which may be mentioned the direction, temperature, velocity and character of the winds whether they be wet or dry. Air is cooled and rendered less able to hold aqueous vapor until at last a temperature, the Dew Point, is reached, at which vapor begins to be condensed.

Practically this dew point is determined by the readings of a dry and a wet bulb thermometer, since the difference between them has been empirically obtained and mathematically tabulated to bear a certain ratio to the *complement* of the dew point, *i. e.* to the difference between the temperature of the air and of the dew point. In order now to estimate the weight of aqueous vapor actually present in the air, it is necessary to have determined the elastic pressure or tension of vapor (*i. e.* the amount of barometric pressure due to aqueous vapor), not at the temperature of the air but at the temperature of the dew point. The weight of aqueous vapor can then be calculated.

It is evident first, that the dew point does not depend upon the temperature of the air; secondly, that the temperature of the air has nothing to do with absolute humidity *except to fix the highest possible limit to its amount;* thirdly, that it is the *vapor tension of the dew point which fixes the actual amount of aqueous vapor* present at a given air temperature.

To these rules one exception should be made. When vapor tension is at its maximum, *i. e.* when the air is said

[2] It is true that with a high temperature there is, as an abstract law of physics, a *possibility* of more aqueous vapor being present than with a low temperature. We are not, however, discussing *possibilities*, but *actualities* of our daily surroundings.

to be "saturated" with vapor, the complement of the dew point is zero, *i. e.* no evaporation is going on, and there is no essential difference between the readings of the two thermometers. At such infrequent times only does the absolute humidity depend upon and vary with the temperature of the air.[3]

Nor can we say that there is such a general correspondence between the curves for air temperature and for absolute humidity that for all practical purposes we can assume an inter-dependence. The curves upon study are found not to correspond closely with each other; indeed we know that the same degree of temperature will by no means always cause the same degree of absolute humidity either in the same or in different localities. For example, Boston, Denver, Santa Fé, Boise City and Winnemucca, Nevada, have all nearly the same degree and curve for temperature; yet Boston has a much higher degree of absolute humidity than has any of the others, while Denver, Santa Fé and Boise City have more than Winnemucca. In Denver and Santa Fé, too, may be seen how little of mere *similarity* exists between the curves for temperature and the amount of aqueous vapor. (See Charts.)

RELATIVE HUMIDITY.—Turning now to the consideration of Relative Humidity, we find it to be usually defined as the ratio or percentage of the vapor actually present at any time in a given volume of air to that required for the full saturation of the same volume.

Such a definition plunges us deep in an inextricable confusion of ideas by employing terms which have survived long after the theories have disappeared under which they were developed. Moisture, dryness, humidity, vapor and

[3] Yet this exceptional atmospheric condition is substituted in argument for ordinary, every-day conditions, and is the base upon which the whole superstructure of the "dry air" theory of disease is reared. See Annual Report of Michigan State Board of Health, 1881, page 427.

saturation are rarely used with precision and consistency in even scientific discussions. What can be more perplexing, for example, than to find that after a writer has discarded as worthless the data of relative humidity he continues to refer to "sensations of dampness" to illustrate the fact that although over a wet soil we find a low temperature and a small absolute humidity (a dry air), we frequently find also an atmosphere "saturated" with moisture. We all know that a wet soil is a cold soil, has a high relative humidity and often a misty atmosphere; can the locality be considered both wet and dry at the same time?

Somewhat akin to this is the common and unfortunate confusion with each other of clouds, mists, fogs, dew and true vapor, the use of the terms humidity and moisture to include both true and partially condensed vapor, and finally the use of the term vapor when we do not mean true vapor but only liquid water in a state of extremely fine subdivision. This is a relic of a seventeenth century idea that the "particles" of water vapor or the minute cloud particles with which true vapor is often confounded are of vesicular form, that they are minute bubbles instead of drops, and that they can therefore float freely in the air. Although the air may be full of moisture in the shape of globules of water for hours without a large amount of true aqueous vapor being present, true vapor is not sustained in the air like water in a sponge nor does it float like particles of dust. It is one of the actual gases of the air, sustains itself like other gases and is governed by the laws of gases, so that using air in its general sense we should say that air contains watery vapor just as it contains oxygen.

A similar confusion of ideas is embodied in the use of the term "saturation" of air, as though air dissolves and holds water in the form of vapor much as water dissolves salt. The air does nothing of the kind, for at a given temperature the same quantity of vapor that can exist mixed with air may

pass into a vacuum and remain there without the presence or aid of air. Relative humidity then has no relation to air, but according to a law of gases is strictly speaking a relation between vapor and the space it occupies.

In other words, relative humidity is a ratio of elastic pressures, the elastic pressure of the dew point and the elastic pressure of the air temperature.[4] As the dew point approaches or recedes from the air temperature, so will the relative humidity or the evaporating power of the atmosphere vary. Instead of saying that the vapor now present is a certain per cent. of "saturation," it would be more precise and far less confusing to say that the tension of the vapor now present is a certain per cent. of the highest posssible vapor tension at the given air temperature.

OBJECTIONS TO RELATIVE HUMIDITY.—It is evident at this point that the reason for accepting *absolute* and rejecting *relative* humidity, because "our knowledge of the humidity of the atmosphere is not gained by the simple observation of an instrument as is our knowledge of the temperature, but through laborious computations by means of tables and employing the results of observations of two instruments—the wet bulb and dry bulb thermometers—so that there are more chances for errors in observation and computation,"[5] is not a valid one. Both sets of data are derived from the same instruments and the same observations; the labor of computation and the chances for errors are no greater in the one case than in the other, while in neither case are they especially laborious.

[4] Since vapor tension and absolute humidity are correlated terms, we can also determine relative humidity by a ratio of weights of aqueous vapor, *i. e.* by a ratio of the absolute humidities corresponding to the given vapor tensions or elastic pressures.

[5] The Causation of Pneumonia, by Henry B. Baker, M.D., in Annual Report of Michigan State Board of Health, 1886, page 285. We ought indeed to say that the author intends to reject *all data* of humidity whatsoever, and *estimate* the absolute humidity by the simple observation of the thermometer.

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The objection that has been made to the use of *relative* humidity, on the ground that it "is not a per cent. of some fixed quantity, but is a per cent. of a quantity which varies with every degree of temperature,"[6] is more plausible and confusing. Strictly speaking, however, the quantity represented by "100% of saturation" is a *very* fixed one, being the quantity of aqueous vapor which will give the highest possible vapor tension at the given air temperature; and this vapor pressure is definitely fixed for every degree of temperature.[7] If, on the other hand, it is meant that the vapor tension represented by 100% varies according as the air temperature varies, it does not because of this fact vary with any greater irregularity than does the absolute humidity which depends upon a varying dew point. Nor does it represent anything that is "unreal," fictitious, problematical or hypothetical about the atmosphere. It represents actual conditions of our surroundings, just as true and just as important to us as absolute humidity; but not the same conditions.

Influence of Relative Humidity upon Health.—If water evaporates into dry air, the elastic force of the vapor tension is increased and the mixed vapor and dry air, if free to expand, as is ordinarily the case in the atmosphere, will occupy a larger space than did the dry air. When then the relative humidity is high we inhale at each inspiration slightly less of oxygen than when the relative humidity is lower.[8] The difference is slight, yet

[6] Report of Michigan State Board of Health. 1881, page 427.

[7] Since the very meaning of the idea of "saturation" must be a co-incidence of dew point with air temperature, we determine our 100% by regarding the given air temperature as the dew point.

[8] At 80° F, for example, when the relative humidity is 90%, the volume of mixed air is one-thirty-third greater than that of dry air, but when the relative humidity is 60%, the volume is only one-fiftieth greater. Patients with asthma, advanced lung trouble or heart disease, quickly detect such differences by the increased difficulty and rapidity of breathing when the relative humidity is high. The same fact is made clear in another way. Air charged with vapor is specifically lighter than when without vapor. The weight of a cubic foot of

we all have noted the influence of muggy weather, not only upon our feelings and moods, but upon our mental and bodily activity, and it does not seem improbable that some of this languor may be due to a slight diminution of the oxygen we breathe.[9]

There are, however, more important reasons why the degree of relative humidity is of value to the physician. Since relative humidity is the measure of the evaporating power of the air, it is evident that the expired air will be less rapidly evaporated in the buccal passages when the relative humidity is high than when it is low. Besides CO_2, this vitiated air contains various organic impurities—albuminoid ammonia—which rapidly putrefy, and are in part the cause of the odor of the breath. It is probable that many of them are of a poisonous nature, since an atmosphere which contains simply 1% of CO_2 has very little effect upon the animal economy, while an atmosphere into which 1% of CO_2 has been passed by breathing is highly injurious.[10]

Another potent factor in health is perspiration, not merely the sensible but the insensible, which passes off at once as watery vapor, containing, like the breath, volatile effete material. In proportion as the evaporation of this perspi-

dry air at 60° F. is 536 28 grains, and that of a cubic foot of vapor at 60 F. is 5.77 grains. These conjoined weights would be 542.05 grains, but owing to the enlargement of the air the actual weight is 532.84 grains.

[9] At excessive elevations where the air is very rare, this drowsiness and diminution of oxygen is of course observed in much greater degree, but the involuntary increase in the frequency and deepness of respiration fully compensates for it, since it is not until the oxygen sinks to about 14% of the air that its full supply ceases to be absorbed by the blood. Pflüger's theory of sleep, which is the most physiological, complete and satisfactory one (see my paper on The Cause of Sleep, in Boston Medical and Surgical Journal, May 6, 1880), depends upon the diminution of oxygen in the tissues of the body. Hence sleep is a cessation of bodily and mental effort, in order that oxygen may not be so rapidly consumed as it is in activity, but may be stored up in the system. Awakening will then take place when sufficient oxygen has accumulated for the maintenance of bodily activity.

[10] The nitrogenous matter existing in air may be in the form of dead or living material of various kinds. It is probably in combination with water, since the most hydroscopic substances absorb the most of it. It may be a reason, additional to the possibilities to be given later in this paper, for the unhealthiness of low wet soils with great moisture in the air. See also Report on the Meteorological Conditions and their Relations to the Epidemic Influenza, by N. S. Davis, M.D., LL.D., Jour. of the Amer. Med. Assoc., June 7, 1890, page 817.

ration is impeded, these products must be excreted by a vicarious activity of other organs which may resent the imposition, or else will be re-absorbed within the system and cause not only disagreeable odors but morbid inactivity of the functions of the sweat glands with a slight pyrexia and mild degree of systemic poisoning. If the relative humidity be such, however, that a rapid evaporation of the perspiration can take place, the temperature of the body may remain very nearly normal, even though the atmospheric heat be extremely high. In this way relative humidity is of value as a regulator of body heat, and becomes of supreme importance in diseases of the heart and kidneys where a free secretion and rapid evaporation from the sweat glands is absolutely necessary, not only to rid the system of its waste products but to relieve the blood tension and functional activity of the diseased organs.

From these hasty examples, then, it may be seen whether we as physicians ought to neglect data of relative humidity, and whether, as has been claimed by meteorologists, relative humidity "gives results of no practical importance to the invalid."[11]

It is true we can derive little benefit from such data when they are taken apart from temperature; neither, as I shall show later, can we form data of absolute humidity when they are taken apart from the dew point. Temperature should never be omitted from consideration, but temperature is by no means the only factor that we must use; it is only the argument, so to speak, upon which the story of nature is based. Without doubt also we can ill afford, in estimating the clemency or severity of a climate, to omit the daily range of temperature. This range is often considered to depend upon the existing degree of absolute humidity, but absolute humidity is not of spontaneous origin, it is

[11] Where shall we Spend our Summer? Gen. A. W. Greely. Scribner's Magazine, April, 1888, page 485.

only a single factor, and a mediate one at that, in equalizing temperature. The true cause of the range of temperature lies back of absolute humidity, and depends ultimately upon the united action of many factors—the temperature, the amount of sunshine, the nature of the soil, and the direction, velocity and character of the winds.

To such an extent, however, are the winds modified by variations in the contour of the country, the hills and valleys, the forests, the lay of the land, whether it faces north, south, east or west, and its position in regard to the sea, that any single set of data which depends upon these local peculiarities, and can in a measure, however imperfect, reveal them, should be of especial value to us. Such data are offered in the ratios of vapor tensions, and some of their interest and importance may be seen by reference to the accompanying charts. The superficial objection then that has been raised, that relative humidity gives results fickle and of no practical value, because so profoundly influenced by local causes,[12] should in itself be sufficient warrant for making use of relative humidity, if nothing else even could be adduced in its favor.

But relative humidity has still further interest for us. Suppose that into a warm atmosphere with a dew point nearly identical with the temperature of the air, *i. e.* to speak popularly, nearly "saturated" with vapor, there blows a cooler air; the temperature will be lowered, but the vapor tension will be reduced in a much greater ratio so that clouds may form, condensation of vapor will take place and dew be deposited, fog appear or rain fall. So, too, if into a cool atmosphere a warm moisture-bearing wind[13] blows, the same cloud formation and aqueous condensation will take place. And not only is the amount of this precipitation

[12] Moisture and Dryness, Chas. Denison, M.D., page 23.

[13] By moisture-bearing winds I do not restrict myself necessarily to winds bearing only vapor—they may bear also liquid water in fine suspension.

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important to health; its daily distribution, *i. e.* the *frequency* of dews or storms, is equally of value.[14]

So far, however, am I from maintaining that relative humidity is the most important element in estimating the relations of climate to health, or even a more important element than absolute humidity, that I believe the truth to be that we are not only precipitate in ascribing supreme importance to the weather in the maintenance of health, but too fond of generalizing from weather data that are incomplete and therefore misleading. No *separate* sets of weather nor all combined can adequately represent a climate in its health advantages. We must have also data belonging to the geographer, the chemist and the geologist. Life and its influences are not made up of discrete phenomena which can be abstractly discussed apart from every attending circumstance, as can experiments in a physical laboratory, and our daily status is merely the resultant of a vast correlation of conditions which do not and which cannot, in the existing order of affairs, work in any other than a connected manner, dependent the one condition upon the others.

I am not here extolling the advantages of any particular climate or locality, but even were I estimating comparative climatic values I am sure I should give a place to *relative* as well as to absolute humidity and *should neglect neither*.[15] Nor am I constructing hypotheses to account for the causation of disease. I have no pet theories to weave into the very texture of my thoughts. I am simply searching after truth wherever it may be found, and can therefore accept as a contribution to my knowledge some sets of data

[14] For the influence of forests upon evaporation and rain-fall, see B. E. Fernow, Chief of Forestry Division, Special Report in Report of Secretary of Agriculture, Wash. 1889, p. 297 *et seq.*

[15] In the comparative study however of the variations in monthly or seasonal influence upon disease where we already know the *general* degree of the absolute humidity, I regard *changes in relative* humidity as of more importance than changes in absolute humidity. See my paper on Phthisis and Pneumonia in Massachusetts, Communications Massachusetts Medical Society, 1888, page 272.

which another might regard as a hindrance to the development of his theory.

As has been said by eminent authority,[16] "it is significant of the state of public knowledge in respect to humidity that local writers use and all interested quote that phase of humidity which best suits their line of argument." This is no more applicable to enthusiasts praising pet localities as health resorts than it is to scientists who see confirmation of their theories in everything they agree to look at, but who do not agree to look at everything that is before them.

THE COLORADO ATTEMPT TO ESTIMATE HUMIDITY AND CLIMATE.

Of the theory of humidity devised by Dr. Denison of Colorado[17] there is little to say, but that little should be very emphatic. The maps are inherently pernicious in their influence, although their brilliant colors and the general air of official meteorological authority give them at first blush an apparent but fictitious value. Denver is made a Garden of Eden, but unfortunately for science and for accuracy the Rating Tables[18] upon which the whole climatic theory depends are made by averaging unlike averages, by adding together such unlike data as averages of relative humidity and cloudiness expressed in per cents, and the product of

[16] Where shall we spend our Winter? Gen. A. W. Greely. Scribner's Magazine, November, 1888, page 606.

[17] Moisture and Dryness; also Annual and Seasonal Climatic Maps of the United States, by Charles Denison, M.D., Denver, Colorado, 1885.

[18] To obtain the "Rating Mean" of humidity, Dr. Denison estimates the means of the *relative* humidity records of the Signal office stations throughout the United States to be 67%; 67% of the *absolute* humidity in *tenths* of grains is then obtained for every degree of temperature, and the means of Signal Office data of cloudiness are calculated to be 44.5%. One third of this sum gives the Rating Mean for a given temperature, ignoring altogether the Dew Point. Compare with this Rating Mean one third of the sum of the actual records given of the above attributes for any place, and the difference, plus or minus, shows the rate of humidity of that place. The only official and valuable portion of this scheme is the actual records of the Signal Office prepared for the Colorado State Medical Society; their distortion is Dr. Denison's idea.

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absolute humidity expressed in tenths of grains multiplied by an average percentage of relative humidity. The process is much like adding apples to pears and expressing the sum in terms of plums, and there cannot be the slightest shade of reason why the system or the charts should give the least idea of humidity or of climate.

THE COLD WEATHER (DRY AIR) THEORY OF DISEASE.

I have discussed the subject of humidity thus in detail not only because there are meteorologists who believe that *absolute* humidity has the greater influence upon health, but because upon the rejection of *relative* humidity has been reared by a diligent and conscientious observer a cold weather theory of the causation of disease[19] (pneumonia, bronchitis, influenza, phthisis, small-pox, scarlet fever and diphtheria), acceptable to meteorologists but in my opinion fallacious.

The foundation of the whole theory rests upon the assumption, which we have proved unwarrantable, that low temperature always and necessarily means low absolute humidity. Depending upon this assumption is the further hypothesis that this low absolute humidity induces disease, not only lung but also other diseases, by its action upon respiratory mucous membrane, because the air which is exhaled from the lungs rapidly abstracts water from the body, since it leaves the body at about the temperature of the blood and is always "saturated" with moisture.

The best physiologists state on the contrary that the temperature of expired air is as a rule from 3° to 5° F. below the temperature of the body, and varies not only with the relative temperature of the blood and of the inspired air but

[19] Henry B. Baker, M.D., Secretary of the Michigan State Board of Health. The Causation of Pneumonia in Annual Report of Michigan State Board of Health, 1886, page 246. The Causation of Cold Water Diseases, ibid, 1887, page 197. The Climatic Causation of Consumption. Journal of the Amer. Med. Assoc. Jan. 18 and 25, 1890, pages 73 and 116.

with the rate and depth of breathing.[20] Admitting, however, that cold inspired air is expired at a warmer temperature, it does not therefore follow that it is saturated with vapor. In fact it probably is not saturated when it leaves the body because, although saturated in the deep lying bronchi, it meets the lower temperature of the air the moment it strikes the buccal mucous membrane, and suffers a condensation within the mouth and throat, the vapor tension following the same law of rapid decrease as in the formation of clouds and mists in the open air. So that although it is undoubtedly true that in a cold atmosphere the weight of vapor extracted from the respiratory mucous membrane may be considerable, it by no means follows that it is so enormous in amount as has been claimed or of disastrous results to the system.

But it is not low temperature alone which has the power of absorbing moisture from the body and respiratory organs —mark the influence upon skin, hair, nostrils, mouth, lips and throat of a high wind, causing rapid evaporation and *low relative humidity* when the temperature is high.

Indeed to make the "dry air" claim thoroughly consistent with itself, the argument based upon low absolute humidity should be carried one step further. Air with low absolute humidity occurs not only with low but also with high temperatures, as is seen in Arizona, New Mexico and parts of Texas. Considering then for example pneumonia, we are driven to the conclusion that it is not cold climates alone that cause the disease, but hot climates as well; and when we have reached this point we are probably nearer to the truth than are some of the cold weather theorists.

Physiological experiments upon animals have clearly shown that mere frigid temperature is not provocative of

[20] A Text Book of Physiology, M. Foster, page 265. Medical Physics, John C. Draper, 1885, page 587. The statement made by physiologists is that air is "saturated" with vapor when expired from the *lungs;* and such a statement is undoubtedly true.

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pneumonic consolidation, but that if, after an exposure to high and then *suddenly* to low temperature, the animals were inoculated with the pneumococcus of Friedlander, they succumbed to the disease more readily than animals similarly inoculated without exposure to such ranges of temperature.[21] The Census of 1880 gives presumptive evidence that the greatest prevalence of pneumonia is in the southern and southwestern states; arctic voyagers do not report it to be frequent in that region, while the united testimony of clinical reports prove it to be a disease from which no climate is exempt.

Why should cold weather and low absolute humidity *per se* cause disease? Because, it is claimed, of the abstraction of the chlorides from the blood by the process of osmosis and their accumulation in the tissues. It is clear that under such a theory salt must be at certain cold seasons of the year a positive poison to the system. I confess that unless some other factor besides dry air be given us, I can see no adequate cause, except chance, for the occurrence of any particular one of all the crop of diseases I have mentioned, some contagious and some not. So far however as Massachusetts at least is concerned, there are marked differences in the distribution of some of these diseases, and probably therefore marked differences in their causation. Our carefully kept statistics not only prove that pneumonia is less frequent and phthisis more frequent on the coast than in the interior; they also show that pneumonia does not reach its highest rate in the coldest months of winter but in the variable months of spring.[22] Other conditions besides the inhalation of dry air, the presence of salt in the respiratory mucous membrane and the osmosis of albuminates from the blood through these mucous membranes, are undoubtedly at work to cause such distinct

[21] Bull. de Thér., Dec. 15, 1889.
[22] Phthisis and Pneumonia in Massachusetts, *loc. cit.*

diseases as phthisis and small-pox. But that salt inhaled and deposited within or upon the body is not altogether provocative of disease is abundantly proved by the health of workmen in salt manufactories and lagoons, and their freedom from respiratory diseases as well as from rheumatism and neuralgia.

If the "dry air" theory be correct, we are indeed placed between Scilla and Charybdis. Send a consumptive on an ocean voyage to recover health, he is exposed to greater dangers, in spite of the purer air, from phthisis, pneumonia, diphtheria or small-pox than he was at home, because he is breathing air the saline constituents of which will irritate the respiratory mucous membrane. Send him inland to recover health, where the air is cold, dry and free from salt, he is exposed to the same dangers, because of the exudation of these same salines from the blood!

The whole confusion upon this matter lies in the assumed powers and properties of high temperature and of dry air (absolute humidity). On the one hand, the simple fact that hot air *can* hold more vapor than cold air, does not *make* it hold more at a given time and place except under the influence of other factors. So too, although cold air is dryer (absolute humidity) than hot air, we ought not to base positive arguments upon the half truth that "cold air is always necessarily dry air,"[23] as though there could under no conditions except temperature be any comparative degrees of dryness.

On the other hand, what possible inherent power, for good or for evil, can one, five or ten grains of aqueous vapor have upon us when they are considered abstractly and apart from any relation to our bodies? The very moment, however, that we begin to discuss the relations of our bodies to the air in which they live, whether its temperature be high or

[23] Henry B. Baker, M.D. The Causation of Cold Weather Diseases, *loc. cit.* page 206.

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low or its absolute humidity high or low, at that same moment we are actually discussing the question of *relative* humidity whether we call it by that name or not. There is no way in which we can discuss the absorption of moisture from our bodies by the air, except by a consideration of *relative* humidity. All that the "dry air" (absolute humidity) theorists have therefore done is quietly to substitute the temperature of the blood or of the body for the temperature of the air, virtually compare its vapor tension with the vapor tension of the air temperature (disregarding altogether the dew point and its vapor tension), claim to ignore the data of *relative* humidity but calmly use its principles. If we may be allowed the unscientific phrase, they have discussed the *relative* humidity of the body, even though they are not willing to study the *relative* humidity of the air.

Since, however, the temperature of the surface of the body is modified by external atmospheric conditions, as we have seen, and the temperature of the blood similarly modified but in a different degree, it is evident that for an air temperature which is easily obtainable they have substituted body and blood temperatures that they cannot so readily obtain. If it be claimed that facts show these temperatures of the body and the blood to be fairly constant under all ordinary air temperatures and atmospheric conditions, I reply that this constancy is possible only under the play not of absolute but of *relative* humidity,[24] acting both directly and also through the regulative mechanism of the nervous system;—a further proof of the value of *data of relative* humidity.

[24] For example, with an absolute humidity of 1.676 grains of aqueous vapor the dew point will stand at 26° F. Now a dew point of 26° with an air temperature of 70° means a large evaporating power—20% of *relative* humidity, but with an air temperature of 45° it means a much smaller evaporating power—47% of *relative* humidity. The relations of our bodies to external phenomena are inherently complex, and we cannot make them simple by bare assumptions of possibilities, by speculations and inferences which are unsupported and unsupportable by facts.

CLIMATIC ILLUSTRATIONS.—To what extent are our conclusions corroborated by actual climatic conditions? If as has been claimed, cold weather be the cause not only of pneumonia but of such dissimilar diseases as pneumonia, phthisis, measles, scarlet fever, diphtheria and small-pox by virtue of the simple assumption that cold air is dry air (low absolute humidity), what shall we say when we find cold, dry facts to demonstrate that although the temperature of Boston is almost identical both in curve, that is seasonal variation, and in degree with the temperature of Denver, the absolute humidity is far greater than that of Denver?

If the "dry air" hypothesis be correct, Denver is more causative of pneumonia, for example, than is Boston.[25] On the other hand, if it be the general *similarity* of the curves for absolute humidity and for temperature that determines the causation of pneumonia, then since there may be granted a superficial correspondence between these curves for Boston and for Denver, both places are equally causative of pneumonia. It is evident that both of these propositions cannot be true at the same time. If again it be *the similarity of the curves for absolute humidity and for pneumonia* that determines the cause of the disease, grave doubts arise as we have said upon the question of facts.

To go still further, if it be low absolute humidity that is the ultimate cause of pneumonia, then Camp Thomas in Arizona and El Paso and Fort Davis in Texas, all of which have an absolute humidity nearly as low in degree and generally corresponding to that of Denver, but a much higher temperature, should be as subject to pneumonia as is Denver, while Winnemucca, Nevada, with an almost total

[25] That pneumonia is particularly fatal in Denver is no argument upon this point, since the same fact is also true of any other locality at great elevation. The excessive altitude depresses the heart, and by its deficiency in oxygen compels a remarkable activity of lung tissue in order to oxygenate the blood thoroughly. These factors, potent to health and metabolic activity of tissue, militate positively against *recovery* from pneumonia with its determined pulmonary congestion and lessened quantity of aërating lung.

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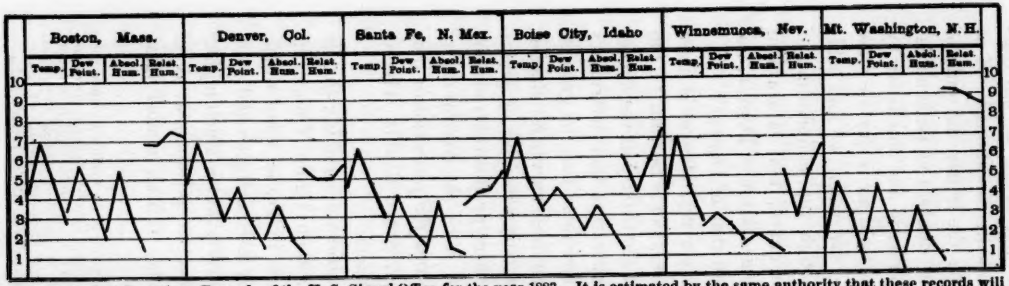
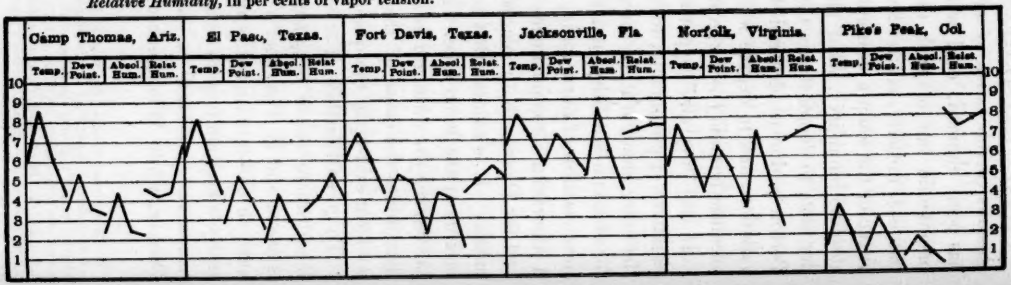


Meteorological Data from Records of the U. S. Signal Office for the year 1883. It is estimated by the same authority that these records will not vary 5% from the means determined for a series of years.

Temperature and *Dew Point*, expressed in degrees Fahrenheit.
Absolute Humidity, in grains of aqueous vapor per cubic foot of air.
Relative Humidity, in per cents of vapor tension.



absence of absolute humidity but yet a high temperature, should be still more subject. Owing to *other causes* this may be true, but the conclusion we have drawn is both consistent and at the same time gravely inconsistent with the *cold* weather theory.

Again, the absolute humidity of Denver and of Mount Washington, both of them mountain elevations, shows a more marked correspondence of degree and of curve than any of our previous illustrations; but the temperature of Mount Washington is far below that of Denver. Mount Washington and Pike's Peak, however, with a nearer correspondence of temperature but a great difference in elevation and surrounding conditions (*i.e.* local peculiarities), have an absolute humidity very unlike. So too, Camp Thomas, El Paso and Fort Davis have all the same approximate degree and seasonal range of temperature as Jacksonville and Norfolk, yet an absolute humidity of far less degree and range.

On the other hand, by a study of the *relative* humidity of these same localities we are driven to the irresistible conclusion that apart from temperature there are atmospheric conditions in these different places which must exert an important influence upon daily life and comfort. I cannot here go into full description of the peculiarities of each locality. It serves my present purpose of illustration to say that in every instance it is the data of relative humidity which serve as guide boards to climatic characteristics essentially local—characteristics concerning which absolute humidity can tell us little or nothing. In the one case this characteristic will be the amount of sunshine, in another the amount of moisture condensed as mist, fog or actual precipitation, and in another the direction and character of the winds.[26] It is clear therefore that a low absolute does not

[26] See Note 13.

necessarily carry with it a low relative humidity, nor does a low relative invariably mean a low absolute humidity.

SUMMARY OF HUMIDITY.—The conclusions of this study of Humidity are important. Let us assume an air temperature of 25° "saturated" with vapor, conditions easily borne by the body, to be introduced into a room through the cold air box of a furnace. Now by heating the room to 70°, the relations of the aqueous vapor to the space it occupies have been changed; the "*relative* humidity of the air" will be reduced and possibly to an unbearable degree, but the absolute humidity will remain unchanged. In other words, *warming the air* has changed its character, has so increased its capacity for *holding vapor* that it will abstract moisture from every surface with which it comes in contact.

The effects upon our systems are manifold,—a parched mouth and skin, a paralyzing of the heart, a throbbing head and a creepy, chilly sensation in the body. None of these sensations were present when the air was cold, although the absolute humidity was precisely the same; nor did absolute humidity work the change. It is clear then that in this instance it is not the low degree of absolute humidity but the low degree of *relative* humidity that may induce disease by abstracting *moisture* from the body.

Let us on the other hand assume a wet soil with its low temperature and low absolute humidity. Owing to the *slight capacity of such air to hold vapor*, it *cannot absorb* much vapor; the relative humidity is already high. The major effect of such air is to abstract *heat, not moisture*, from both the body and the lungs. Only when evaporation is rapid, that is when the relative humidity is low as on a cold, bright winter day, will cold air be markedly a drying air, unless indeed it may be said to abstract moisture by freezing it.

Barometric Data.—There is, however, another set of data that has important relations to health but that has not yet received from physicians the attention it deserves. We have seen that whatever conditions tend to *lower the capacity* of the air to hold vapor, that is to raise the *relative* humidity, must in the nature of things obstruct the orderly functions of the body. Some of these conditions are present when the barometer is falling from changes in the weather, so that bodily phenomena are somewhat the same with a low barometer as with a high *relative* humidity.

In addition, however, to these functional derangements must be mentioned the influence of atmospheric pressure upon blood tension and the heart's action. When the barometer is falling, the blood pressure is lowered and the heart's action depressed. Our individual feelings are evidence of this nervous and vascular disturbance; on a first clear day following a "spell" of dull weather we are sleepy and more easily than usual tire with moderate exercise, while on a lowering day before a storm we feel a languor and depression. To persons who are either enfeebled by protracted disease, suffering from shock or inflammation, or about to undergo a surgical operation, a sudden fall of barometer may bring disastrous consequences, consequences which the physician warned by the barometer might have averted.

Atmospheric Electricity.—Yet after all we are driven to the thought that neither the germ theory, nor the influence of the gross conditions of the weather that we have thus far studied, nor even the combination of these factors with inherited tendencies, occupations, modes of life, etc., offer in all respects an adequate explanation of the causation of disease. Although a high temperature and great moisture are theoretically the ideal conditions for the growth of germs, the fact remains that many of our well-marked germ

diseases, both contagious and infectious, originate or at least develop in an atmosphere that is *cold* and either wet[27] or relatively humid.

There is considerable probability that upon the surface of the earth, whether by the friction of revolution or of the winds, electricity is produced and stored up, the negative in the earth, the positive in the atmosphere. The air is full of this potential force,[28] and there is no phenomenon ever studied which begins to show such rapid and incessant variations. What it means, whither the force goes and what it does, are all beyond our present knowledge. Only infrequently does it become dynamic so as to manifest itself by gross outward phenomena; yet it must have a silent, ceaseless function.

This much, however, we do know. In dry air there is very little evidence of the presence of electric force —in fact it is probable that if air could be made absolutely dry and kept so for any length of time, no electricity could be present in it. But in wet air and a cold temperature, conditions which we all recognize to belong to a low, wet soil, it is equally well known that the atmosphere is peculiarly full of electricity, and it is altogether probable that this surcharge is an overplus of the negative

[27] One theory of the influence of these conditions upon at least phthisis has been offered to me in a correspondence with Prof. Cleveland Abbé—that "rain and fog precipitate and wash downward germs of diseases which are floating in the air; therefore the low valleys and meadows are more subject to consumption than high lands or dry interior. It is not because the temperature, humidity and pressure vary, but because rain and fog prevail when they vary, that the disease is developed in that locality."

[28] The amount of electricity thus stored up is enormous. At times the negative current and at times the positive current is in excess; even when neither is in excess of the other interchange in the vast majority of cases goes on without phenomena perceptible to our senses. Some of its influence upon our functions may however be noted before a thunder storm—a sense of fulness and oppression in the head and frequently a decided nausea. Nor does the immunity of workmen in electric manufactories and the constantly increasing use of manufactured electricity without perceptible influence upon health militate against any theory of the possible influence of atmospheric electricity upon health; since in the former case the great quantity of metal in machinery and elsewhere will convey away and neutralize escaping electricity, while in the latter case it is probable that the very presence of electrical wires and points will in the same way facilitate the interchange and neutralization of atmospheric electricity overcharged.

electricity of the earth rising in the air to meet somewhere its corresponding positive. My prediction is that when this intricate but fascinating subject shall be more fully studied, some connection will be established between atmospheric electricity and the phenomena of disease in, at least, cold and wet localities.

OZONE.—I omit all discussion of ozone, that electrical form of oxygen, because our knowledge upon the subject is so uncertain. If this gas be abundant in pure air it would lend support to the popular opinion that it is health-giving and recuperative. But it is impossible to say whether this notion be a correct one or not, since the observations that have been made have been so vitiated by the varying exposure to winds and to coal gas and sulphurous acid gas, the products of combustion, that they are without positive value. If recorded data are of any value, they tend to show that, contrary to expectation, more ozone is present in the winter than in the other seasons of the year; but I have great doubts that we know anything about the matter.

CONCLUSIONS.

1.—In tracing a connection between the weather and disease the tendency is to go too far and ascribe to atmospheric conditions more of a causative influence than we can prove. Because a climate may expedite or inaugurate a cure is no inherent proof that a climate, even though it have the opposite atmospheric conditions, will *per se cause* the disease.

2.—Climate means more than the weather, and includes data concerning the contour of the land, the situation of hills and forests, and the nature and chemistry of the soil.

3.—With no reason can we measure a climate by its absolute humidity alone, or ascribe to absolute humidity the

supreme control over the origin of disease. Co-incidence of data does not necessarily show a causative relation.

4.—The degree of absolute humidity is more a resultant than a cause of atmospheric conditions, although it may be frequently a *mediate* cause of atmospheric *changes*. In no way, however, can we measure the value of absolute humidity or discuss its influence upon our bodies until we bring it into relation with something beyond itself. We are, therefore, constantly discussing *relative* humidity, if we use the English language with its proper meaning.

5.—To assume that the weather controls health and causes disease by its influence upon the respiratory organs alone, is utterly to ignore the vascular and secretory systems of the body with their important functions. The assumption being unwarrantable, all conclusions and inferences based upon it are illusory.

6.—*Absolute* humidity *per se* can have no influence upon health. Its influence depends upon the temperature and accompanying atmospheric conditions. A *low absolute* humidity in *cold* air is the mediate factor in abstracting *heat*, not moisture, from our bodies. A *low absolute* humidity in *hot* air will abstract *moisture* from our bodies proportionate in amount to the degree of *relative* humidity in which our bodies live.

7.—*Relative* humidity measures the moisture-absorbing powers of the air, is an expression of our surrounding atmospheric relations and is modified by and gives us a working notion of the direction of the winds and at times of the amount of sunshine. It represents conditions that are necessary to health and essentially local in their nature. It is therefore of great value to the physician.

8.—The best single datum to be used with the temperature is the *dew point*, since in combination with the temperature it will enable us to determine both the *absolute* and the *relative* humidity. Definitely given also the

amount of sunshine or of cloud, we can form a fair idea of the hygienic value of a given locality to health.

9.—Condensed moisture has a great influence upon health. In some of its phases it is equally as important as humidity (aqueous vapor). When in the form of mists, exhalations and fogs it has, unfortunately, often been confounded with humidity.

10.—The chief atmospheric conditions modifying health, and therefore causing disease, are sudden and violent *daily ranges in temperature*, and secondarily *in relative humidity*.

11.—The *barometer* is an important but too frequently neglected instrument. A single observation of it gives us nothing that is of true value until it has been compared with preceding and succeeding inspections. The barometer should then be in a physician's office for daily use and not for mere display.

12.—We know, beyond doubt, the influence which certain low and wet localities exert upon health, but we do not understand completely the Why of this influence, so that we are not yet able to formulate with precision the general law under which our empirical observation is a particular instance.

13.—I venture the prediction that when in future years our knowledge of the electricity of the atmosphere is more completely studied we shall find in that mysterious force some solution of this problem. But I spin no gauzy theories upon the subject.

ARTICLE IV.

IRREDUCIBLE HERNIA;

A DISCUSSION.

BY

Drs. D. W. CHEEVER, of Boston.
J. C. WARREN, " "
G. W. GAY, " "
H. W. CUSHING, " "
W. ELA, of Cambridge.
C. W. GALLOUPE, of Lynn.
F. H. THOMPSON, of Fitchburg.
F. W. CHAPIN, of Springfield.

JUNE 10, 1890.

IRREDUCIBLE HERNIA.

Dr. C. W. Galloupe, of Lynn:—The great importance of this subject would not be a sufficient reason, on this occasion, for the reiteration of established rules, or the repetition of recorded facts, without the addition of something new in principle or interesting in personal observation. To most practitioners the subject of old incarcerated hernia is not particularly fascinating, and an overgrown suspensory bandage, or an æsthetic pink abdominal belt would be the limit of their treatment, while their gloomy prognosis tends to confirm the discouraged patient still more in his despair of relief. But to cure the incarceration and transfer the contents of the hernial sac to the abdominal cavity where they can be held by a truss is certainly a result worth every effort.

The appropriate treatment for any case will depend, of course, largely upon the age, health, and social status of the patient, but more especially upon the nature of the obstacle to reduction. This may be due to adhesions between the sac wall and its contents, so that the gut or the omentum becomes anchored in its new location; adhesive bands may form near and across the ring, causing a partial obstruction to the return of masses of any size, while not preventing the escape of the abdominal contents, which is favored by the constant, steady pressure of the abdominal walls, and aggravated by the movements of the diaphragm in breathing and coughing, while the peristaltic motion tends to push the intestine through the ring, after a knuckle has been insinuated, in the same manner as it propels the feces. This outward pressure is opposed by the resistance of the abdominal wall alone.

Again, the deposit of fat in a piece of extruded omentum may increase its size and make it irreducible; a fibrous or glandular growth in the mesentery may do the same.

XUM

These processes are more or less chronic in operation, but an easily-reduced rupture may at any time quickly become irreducible through impaction of fecal matter, through peritoneal inflammation, or through the congestion and swelling of acute strangulation. Other accidental causes may prevent reduction:—hydrocele of the sac; ascites; the growth of abdominal tumors; a permanent contraction of the abdominal cavity which would not allow the return of a large hernia of long-standing; or, in the case of children with large congenital herniæ, a lack of commensurate growth of the abdomen.

Incarcerated hernia presents, accordingly, many problems to the surgeon, and the treatment must vary with the prominent features of the case.

Acute strangulation requires about the same treatment in old as in recent hernia, with the exception that palliative measures and temporizing are more allowable in the old. Inflammation of the hernia demands rest, hot or cold applications, opiates, and regulation of diet. Fecal infarction call for poulticing, copious enemata of water, oil, glycerine, etc., with kneading and judicious administration of purgatives, especially salines. Hydrocele of the sac and ascites call for tapping or aspiration, while obstructing tumors must be removed or displaced.

As a preliminary to any active measures the patient should be put to bed, with a good hair mattress for his own comfort and a high bedstead for the surgeon's, lying on his back as much as possible, with the foot of the bed elevated, so that the force of gravity may be utilized to create a constant pressure of the contents of the sac upon the ring; by the same means the sac is emptied of ascitic fluid, and the sac wall of œdema. The bowels should be freely opened, and the diet restricted so as to prevent large fecal accumulations, and favor the absorption of fat. In a stout person I have found Ebstein's system of dieting to rapidly reduce the fat deposits of the whole body.

Returning now to our proper subject, old incarcerated hernia, the obstacles to reduction are mainly three: gluing together of the contents, adhesive band or anchorages, and fatty, glandular, or fibrous growths. An accurate diagnosis in each case is not always possible, nor is it strictly neces-

sary, as the treatment follows the same line. The size of the hernia, and the length of time that it has been irreducible ought not to deter us from attacking it. The problem becomes mainly a mechanical one, and the prognosis will depend upon the ingenuity of the surgeon.

The consideration of a special case will best indicate the treatment.

CASE.—My patient is a large-boned, heavy man, 46 years of age. At the age of 17, while in the act of lifting a cask weighing 825 pounds into the rear end of a wagon, his foot slipped a little on the snow, and he felt a sudden, stinging pain in the left groin. This pain continued, and at the end of a week or ten days he noticed a swelling in the groin as large as the end of a thimble. He kept constantly at work, however, until at the end of two years his father noticed that he seemed weak and disinclined to lift. He then explained the cause of his laziness, and at that time examination disclosed a bunch the size of a hen's egg.

An iron truss was applied by a country practitioner, which was discarded the next day on account of the pain it caused. In five years from the date of injury the hernia had dropped down into the scrotum, and he was then fitted to a knitted bag, which acted as a suspensory. The rupture had increased constantly but slowly up to a year ago, when it was about the size of a cocoanut.

At that time he jumped from a horse-car and felt a sudden yielding, while the tumor doubled in size in an hour's time. Since then it has steadily increased and has prevented him from doing any active work. There has been but little pain, but a constant pull and drag that have made him an invalid and have led him to indulge freely in alcoholic stimulation.

At the time I first saw him, March 28, 1889, the hernia measured 25½ inches in circumference around its base, 30 inches around its largest part, and its length from pubes to perineum was 17 inches. It was of the left inguinal variety, but, on account of its size, and the fact that it had dissected up the skin from the lower part of the abdomen and from the upper part of the thigh, the ring could not be felt nor the contents mapped out. He was placed supine on a hard bed with the foot elevated ten inches, the bowels

evacuated, and the diet restricted to concentrated and digestible foods. At the end of forty-eight hours the œdema of the scrotum had subsided sufficiently to disclose the nature of the contents of the sac. The upper portion contained many coils of gut, while the part nearest the ring and below was solid and nodular. Efforts at reduction were made and a considerable part of the intestine returned. A cotton bandage was then applied in circular turns to form a pedicle to the mass, and three sand bags, of three and five pounds weight, laid on the top, while a broad sling over the shoulders and around the neck held the mass vertical. On the fifth day the intestine could be all reduced, and the mass measured 21 inches in circumference by 14 in length. The residue was omental, the chief obstacle being a hard, solid cake four inches in diameter and two inches thick. The ring could be easily felt, admitting three fingers. From the outset the cotton bandage was applied once or twice daily, and after a few days a rubber bandage outside the cotton. No attempt was made to exert pressure by bandaging across the top, as the effect of this was to gradually squeeze the mass out under the ring of bandage and cause the whole apparatus to slip off. For the same reason the sand-bags were of but little value, the chief reliance being placed upon daily manipulation to break up the omental lumps and dilate the ring, while the tight circular bandage caused an internal tension which constantly tended to squeeze out the contents of the sac. No pain was felt at any time unless the rubber bandage were too tight. If applied directly to the skin it would roll up and cut in uncomfortably, so that the following plan was adopted: ten yards of cotton bandage, two inches wide, were wound around close to the abdomen, including the penis and testicles, each turn approaching as near as possible to the abdominal wall, so as to form a hard constricting collar four inches wide; outside of this was wound the rubber, being worn about three hours at a time.

On April 14th, the seventeenth day of treatment, while squeezing the omental cake, it seemed to separate on one edge and open out to form a crescentic mass, which was insinuated by its smaller end into the ring and by dint of steady pressure was wholly reduced, exposing an opening

which easily admitted four fingers. A graduated compress and spica bandage retained the hernia, and two days later the patient was up and around the room with a water-pad truss on. Much difficulty was found in getting a truss which would retain all the omental masses, but no intestine has escaped since the first reduction. The patient was attending to his daily work when seen in November, and had gained considerably in flesh, while the scrotum had shrivelled very greatly and the ring had closed up about one-half. May 4, 1890, I found the ring contracted so as barely to admit two finger-tips, while the scrotum was still more shrivelled. He reported that there had been no protrusion whatever, although without his truss he has walked about his rooms, and on one occasion jumped out of bed and ran down stairs in pursuit of a burglar. There is now a hard, fibrous mass the size of a hen's egg, attached to the cord about two inches below the ring. This is what bothered us at first in the application of the truss, but it is now evident that the mass does not belong in the abdomen, but is an outgrowth of the spermatic cord. There is no escape of abdominal contents, but when he coughs I can feel a large, smooth mass press against the ring like a valve. The patient now leads a most active life, has gained 20 lbs. in weight, and has given up his rum.

An incarcerated hernia of this size was not a very promising case to undertake, more especially as it had proved itself unyielding to many physicians during the past thirty years;—but having had the privilege of tending a number of such cases under Dr. J. Collins Warren in the Massachusetts General Hospital, I was encouraged to try it by the method of treatment proposed by him.

In considering the mechanics of this treatment we may represent the hernia diagrammatically by a rubber bag filled with fluid, resting upon a rigid ring of less diameter than itself. The problem is to force the ball through the ring. The first aid we have is gravity, obtained by the supine position and elevation of the foot of the bed; next the bags of sand or shot, which adapt themselves to the shape of the hernia and exert a constant pressure; third, the direct pressure of the hands in daily manipulation. In addition to these means of direct pressure we have the constricting

band, which to my mind is the most important feature. If pressure be exerted upon a body of fluid, it is transmitted equally in all directions, and with no loss of power except from the internal friction of the molecules of the fluid. If a cord be bound around a rubber foot-ball with a pressure of ten pounds, there will be exerted at every point of the surface a force of ten pounds, minus the friction of the fluid, which is very trivial. The ring of rubber bandage around the hernia exerts a pressure proportionate to its elasticity, equally in all directions, but this is opposed by the rigidity of the sac wall everywhere except over the ring, where there is no obstacle. Consequently a pressure of ten pounds by the bandage means a direct downward pressure of ten pounds on the ring, minus the friction of the soft and easily-movable contents which obey the same laws as fluids. This is the most valuable part of the treatment. This pressure would be uncomfortable except for the broad bandage of cotton that is first put on to form the pedicle of the tumor, but, when so diffused, it is bearable for one hour or ten hours according to the tightness of the rubber. This can be applied and taken off by the patient at will, and with this pressure I consider the sand bags useless and even objectionable. Next to this, the daily manipulation of the contents assists by breaking up the internal adhesions and dilating the ring. The whole treatment of such a case requires from two to six weeks of rest in bed, which the patient readily becomes accustomed to, and there is but little pain from the manipulation, which can and should be gentle, even although considerable force is used. If, however, it appears that after the greater part has been reduced, there still remains a hard mass that does not diminish, I should give ether and force it in either by separating its substance or tearing the ring,—taking it for granted that such a tear would immediately unite. After reduction a compress and thorough spica bandage should be worn for a few days, then a perfectly fitting truss applied before the patient gets out of bed.

This mode of treatment applies to unbilical as well as scrotal herniæ, and is in that case more easy of application.

In conclusion I would say that the safety, comfort, ease and notable success of this mode of managing large incar-

cerated herniæ, deserve from the general practitioner much more attention then is at present accorded it. To relieve acute obstruction by a skilful though hazardous stroke of the knife, is a gratifying act; to relieve a patient of the long-endured burden of an old irreducible hernia, together with the pain and danger of accidental strangulations, and this by a process comparatively painless and free from danger,—to do this is equally gratifying to the patient and to the surgeon.

Dr. J. C. Warren, of Boston:—This is a subject which has interested me considerably, and to which I have given attention for some years, and therefore I feel authorized to make some remarks on this occasion. In the first place, a word about the development of irreducible hernia. Irreducible hernia is very apt to follow the general life history which Dr. Galloupe has sketched for it in his case. During the most active period of life, from 17 perhaps to 25 years of age, is the period when irreducible hernia first shows itself. For some reason or other, at that time there are difficulties in returning the hernia and treating it as an ordinary reducible hernia should be treated. I think that is what we find in cross-examining the patients with this affliction—that, owing to its being omental, perhaps, in character, or owing to great carelessness on the part of the patients themselves, the hernia has not been returned habitually into the abdominal cavity.

Some of these hernias, in their early stages of development, are exceedingly obscure. Many cases that I have questioned have stated that the diagnosis was not clear; that some surgeons had thought it was varicocele, others a hydrocele of the cord, and others a hernia. There would be a fullness, a more or less well-developed mass in the inguinal region, and an inability to displace it. In one case that I have had, an operation for varicocele was done by a French surgeon, with the idea of curing the case.

As the patient advances in life, business pursuits divert his mind, and he is unwilling to sacrifice the time which is necessary in order to devote himself to the proper amount of treatment required for cure. He tries a truss, and the truss fails to do its work. He satisfies his conscience by

wearing the truss part of the time each day, although it is doing no good, and probably is doing harm. As he reaches the obesity of middle life, the hernia begins to increase in diameter, with the fat deposit that is taking place in all parts of the body. The force of gravity is a force which is constantly acting during the day time to draw the omentum or the bowel out of the abdominal cavity, in addition to the natural intra-abdominal pressure which always exists. The consequence is that when the man has reached the height of his business activity, in middle life, in the forties, he is afflicted with a very large, bulky hernia. An irreducible hernia cannot last through a period of twenty years without becoming also a large hernia. Then we begin to have various little complications, as well as big ones.

Among the little complications is the external irritation to which the patient is subjected. An eczema of the scrotum, in a stout individual who is very active, will become sometimes so great a source of annoyance as to lay the patient up for a considerable portion of the year. That is, one patient of mine was obliged to stay in bed for from 24 to 48 hours each week, in order to allow the congestion of the part to be relieved, and the irritation of the skin to subside, so that he could get about the rest of the week and do his work.

Then of course we have the various complications which you are all familiar with in irreducible hernia, viz., the tendency to become inflamed, the tendency to become incarcerated; I might add, also, the tendency to become strangulated, but that is a rare complication of the type of hernia which I am describing. A hernia which has reached so large a size has a large ring as well as a large sac and large contents. The ring is probably sufficiently large to admit from three to four fingers. Now such a ring as that can never be constricted sufficiently to stop the circulation in the larger vessels which are furnishing the contents with the necessary blood supply. Therefore this fact perhaps it is well to keep in one's memory, that strangulation of these large hernias is not likely to occur. They are more liable to have what is called incarceration, by which are generally understood an obstruction and a local peritonitis, periods of inflammation which are accompanied by local pain and ten-

derness, and perhaps vomiting,—symptoms pretty severe in character, but which do not terminate in gangrene of any portion of the hernial contents.

The complications, however, are sufficiently grave to make it very important to urge upon the patient some effort at relieving himself from so severe an incumbrance. At the present time, when antiseptic surgery and abdominal surgery have placed us in an attitude towards the forms of disease which we were not in you may say even so short a time as ten years ago, it may probably suggest itself to your mind that the simplest operation would be an incision, laying open the sac and dissecting off the adhesions, excising the hypertrophied bars of fatty tissue which represents the omentum, and returning the bowel and sewing up the ring,—the ordinary operation, in other words, for the radical cure of hernia. That operation undoubtedly is done, and can be done a great deal more frequently in surgical practice than we formerly advised. But that operation is not adapted to all cases, and is not indicated in quite a large number of them.

In the first place, the patient shrinks from going through the ordeal of the operation. In the second place, we cannot conscientiously assure the patient that we are going to have a radical cure by that operation, and the probability is that in these large hernias, whether they are inguinal or umbilical, the majority of them will recur to a greater or less extent after a certain length of time. I do not mean to decry this operation. I think it is one of the great benefits that antiseptic surgery has given us—the opportunity of relieving suffering manhood from such a disagreeable affliction as this one. We can undoubtedly relieve the principal symptoms by the operation. We can put the patient in such a position that a light truss will enable him to go about as comfortably as any individual with a small reducible hernia, and I have at present more than one patient who reports to me from time to time, with great satisfaction, his condition after such an operation as I have mentioned.

But perhaps it is more interesting to the general practitioner to know about the class of cases in private practice which Dr. Galloupe has described in the case which may be

considered a typical one of the kind in question. The class of patient adapted to this particular kind of treatment is in the first place the active, busy man, who perhaps dreads the operation, fears that he may be laid up a long time, does not wish to run the risk of an operation, and will consent to treatment without the use of the knife. You know it is a much more seductive proposition than the operative mode of treatment, to the average man.

Then we have another class of patients with organic disease. One of the first cases of large hernia I had to treat had most pronounced Bright's disease of the kidneys, and it would have been manifestly highly improper to perform laparotomy on that patient. His weight amounted to over three hundred pounds. It would have been fatal, undoubtedly, if the radical cure had been attempted. Old people and enfeebled individuals are not good subjects for abdominal surgery of this kind. Perhaps a simple laparotomy for ovarian tumor, with a clean incision, with the relaxed abdomen afterward might be followed by the best results. We know that it is done successfully, even in the aged. Cases have been reported where patients over eighty have had ovariotomy performed, and with satisfactory results. But here we are dealing with a different problem. We are pushing something back into the cavity, and making the cavity fuller, more distended, than it was before. There is always more or less shock after a radical cure of hernia, more than after an ordinary laparotomy in the median line, and I am inclined to think that feeble and large persons, the subjects of organic disease, are not suitable for the cutting operation.

Then again, the treatment is not always applicable, on account of the situation of the patient and his surroundings. The general practitioner is not prepared for the complications of laparotomy. The patient is unable, perhaps, to travel, or to reach some hospital where the operation could be conveniently done, with all the modern conveniences and advantages. Therefore it seems as if the mode of treatment which has been sketched out already was adapted to a very considerable number of cases.

Now, in regard to the treatment. It is not a new treatment. Dr. Galloupe has kindly alluded to me as having

taught him some points about this mode of treating irreducible hernias. Dr. Samuel Cabot, and others of his contemporaries, undertook this method of reducing large and irreducible hernias, over thirty years ago, when I was a medical student, and the method, if I am not mistaken, was derived from the French surgeons; and it was here that the elastic bandage was first used as a therapeutic agent.

The hernia, which we will assume for the time being is a scrotal disease, was caught up by the hand around its pedicle, and formed into a pediculated mass. The bandage was then wound around the neck of this pediculated tumor. If we wind a bandage around the scrotum with hernial contents, the moment we have the bandage wound around we find that it collapses and that its contents have disappeared, not into the abdominal cavity, but rather into the loose fatty and cellular tissue of the perineum or abdominal wall, escaping of course from the grasp of the bandage. It will escape wherever the pressure is relieved. If there is an absence of resistance just around the outside of the ring, we lose the effect of this mode of pressure. Dr. Galloupe supplied this pressure by first winding a linen or cotton bandage around the tumor, and making thereby a pedicle. That is the technical expression—first make the pedicle. He made a cylindrical collar of cotton, which opened at one end into the hernia, at the other end through the ring into the abdominal cavity.

The old French method was to grasp the hernial sac, make a pedicle, and then take one or two very tight turns just above the hand, so as to make a pedicle; then, when that was once made, continue winding the turns over the sac itself, in order to force it back. But the moment you have taken one or two other turns around the bandage, it requires a good deal of courage to leave the bandage there, for it must be so tight, in order to hold the part, that it is practically a tourniquet, and the whole tissue turns such a color that it requires a good deal of courage, as I say, to leave it on there sufficiently long. Of course, venous congestion is relieved by continuing the pressure all over the fundus of the tumor with the wound bandage. That being held in position for several hours will materially diminish the size of the tumor and sometimes will force it

back into the abdominal cavity. In order to get up a firm pressure, which would avoid the danger of mortification of the part, I devised a bag, some years ago, for a particular case. While it was being prepared, the patient was going through the line of treatment that has been sketched. The foot of the bed was raised, so that the force of gravity would act from without inward. The scrotum was held up and weights applied, so as to give a moderate pressure. After that treatment, pursued for several weeks, the tumor diminished about two-thirds in size. There was left a large ball of fatty tissue, which represented the omental part of the tumor, to be disposed of. The bag was made in the shape of a balloon, with an opening about three inches in diameter. It was made of two layers, the inner one being a soft flexible one, and the outer an inflexible one. Being blown up between the layers, the flexible one produced pressure on all sides. This bag was put on like an ordinary rubber bag capable of inflation with air. After it had been strapped down firmly and held to the ring by a large number of figure-of-eight turns in all directions, so that it was buried up with bandages, the pressure was brought to bear by blowing it up with air or water. The pressure was left on for fifteen hours, and when it was taken off the hernia had been reduced. The hernia was about the size of that pitcher [a medium-sized one] originally, having lasted twenty years, and had resisted the efforts of a large number of surgeons. The patient was a victim of Bright's disease. He was comfortable for the remainder of his life, which lasted seven or eight years after the treatment, and he died of Bright's disease. The hernia was kept back by an ingenious strap truss, which he devised himself. I have since then reduced a number of cases in that way, and then succeeded afterward in retaining the hernias.

There are a certain number of hernias which have very large openings, and which after reduction come out again. They cannot be held back by any apparatus. The patient is unable to use the amount of ingenuity and brain work which is necessary to apply and keep in position a truss, or there are inherent difficulties in the problem. In these cases I am content with using a very large, stout, jean-cloth suspensory bandage, and with that form of apparatus the

hernia will be made so much snugger and more manageable and smaller that patients are as a rule satisfied with it. I have an old man, over eighty years of age, who uses such a support, and has used it for ten years, with very satisfactory results. He would never have been able to wear any kind of truss, he was too old for a radical cure, and this seemed to be the best method of treating his case.

Dr. G. W. GAY, of Boston:—In preparing the few remarks I have to offer upon this subject, I have assumed that it was particularly desirable to bring forward our experience in treating cases of old irreducible ruptures, such as heretofore have been accustomed to roam about from hospital to dispensary, or from one physician to another, until falling into the hands of some enterprising man having plenty of time and an abiding faith in antiseptics, they have been subjected to a thorough and prolonged, if not a very successful method of treatment. In other words, the duration of the affection is an element, and an important one, in the classification of the cases which come under our consideration to-day.

In numerous instances, though the rupture has existed for months or even years, yet it has been irreducible only a few days. The symptoms of strangulation are not yet developed, but from the tenseness of the tumor and the discomfort of the patient, they may come on at any moment. The adhesions of the contents of the sac in these cases being comparatively slight, the treatment is more simple and the results are more favorable than in the next class.

The greater number of old irreducible herniæ are brought to the surgeon's notice by reason of a recent strangulation either of the original contents of the sac, or of fresh acquisitions to the same. In many instances an irreducible omental hernia gives very little trouble, until a knuckle of intestine comes down and gets entangled in the meshes of the omentum, when symptoms are pretty sure to declare themselves in a very short time. In looking over the records of the Boston City Hospital for the past ten years, I find that the majority of cases of irreducible hernia come under these two classes: the recently descended, but not strangulated, and the descent of bowel behind the omentum.

XUM

A third and rarer class of cases are those large, unwieldy, unmanageable ruptures of long standing, which have heretofore been the bane of the out-surgeon, and a no very welcome guest to the visiting surgeon of our hospitals. They are bundensome from their size, as well as from the colicky pains and various discomforts to which they give rise. No sort of truss or other appliance is very satisfactory in preventing their slow and sure increase in bulk and weight. They may be composed of bowel, or of omentum, or of both together. The adhesions are apt to be very firm and unyielding, the parts out of all natural proportions, and the different structures enlarged, thickened, and changed in various ways. He who undertakes to relieve these cases by operation, should make up his mind to a long, tedious, and oftentimes puzzling dissection, and not allow himself to be surprised if he is unable to accomplish as much as he would like. These operations require patience, perseverance, and a strong back.

A brief résumé of a few of the cases treated by the surgeons of the City Hospital during the past ten years may be permitted at this time.

I.—A woman, 48 years of age, had an irreducible omental hernia of one year's duration. Five days before coming under Dr. Cheever's care a small knuckle of intestine came down, causing pain, but no other symptoms of strangulation. Herniotomy. Omentum firmly adherent to sac; cut off even with ring. Discharged in seven weeks wearing a truss. Five years later this patient was admitted to the hospital again, with symptoms of strangulation in the old hernia. It was reduced under ether by taxis, and as she was found to be suffering from chronic nephritis nothing further was attempted.

II.—A young woman of 17 had an irreducible femoral hernia, the size of an egg, for one year. Operation by Dr. Gay. Omentum cut off. Well in five weeks, and wearing a truss. Has been under observation over four years, and is now wearing a truss. The rupture has never returned.

III.—A man, aged 33, had an inguinal, omental hernia, of moderate size, for fourteen years. Irreducible for some time, not definitely known to patient. Herniotomy by Dr. Gay. Able to leave the hospital in seven weeks wearing a

truss. Was free from rupture a year and a half later, but did not dare to leave off the truss. These two cases are reasonable cures.

IV.—Direct inguinal hernia in a man aged 21 years. Irreducible for several years. Operation by Dr. Cheever. Omentum removed. Recovered in a month. No truss worn on leaving the hospital.

V.—A woman, aged 52, had an omental femoral hernia for eight months, size of a lemon. Irreducible four days; no signs of strangulation. Herniotomy by Dr. Gay. Omentum ligated and cut off. Recovered in a month, but could not wear a truss.

VI.—Dr. Gay operated upon a woman 52 years of age for an irreducible omental femoral hernia of eight years' duration, in October, 1880. As is very often found in those old omental ruptures, a knuckle of bowel had come down and become entangled in the meshes of the omentum the day before the operation. There were no signs of strangulation. The bowel was returned, and the ring was plugged with the stump of the severed omentum. Wound healed in six weeks.

VII.—A man with an irreducible inguinal hernia of two years' duration, after being treated for a month by compression and position, was operated upon by Dr. Burrell. Omentum firmly adherent to sac. Patient died in three days, and the autopsy revealed fatty kidneys.

VIII.—Two days before entrance, Mr. M.'s hernia (inguinal) came down; taxis failed to reduce it. Dr. Homans did the "minor" operation successfully (sac not opened). Patient discharged well in three weeks. A few months later he returned to the hospital and was operated upon for strangulation at the site of the former operation. Feces escaped from the wound a few days during convalescence. The wound was nearly healed in three weeks, when he left the hospital.

The two following cases occurred in Dr. Cheever's private practice.

IX.—A man, aged 68, had a femoral rupture irreducible for years, size of a small egg. Sudden strangulation; herniotomy. Intestine and omentum in sac. Former returned; latter adherent, dissected off and cut away. Stitches

of boiled silk slowly ulcerated out in two months. Wound then healed; tissues firmly contracted. Patient wears a truss, and is comfortable. A good result.

X.—Man, aged 62, scrotal hernia size of a large fist, irreducible for years, steadily increasing in size, and attracts patient's attention constantly by the discomfort. Operation. Large amount of omentum and eight inches of bowel, both firmly adherent to sac, and to each other. All dissected up and freed, but reduction was impossible until the inguinal canal had been slit up an inch and a half, when the whole was returned with much difficulty, due apparently to the want of room in the abdominal cavity. Wound closed with four boiled silk sutures. Usual antiseptic precautions. Abscess on the sixth day followed by sinus. Slow extrusion of stitches for period of four months. Wound is now nearly healed, but it is to be observed that during all this time the hernia has been solidly held in place by the heavy cicatrix. No impulse, and no truss. Patient goes about.

The result obtained in this last case is the same as is sought by Dr. McBurney in his operation, namely, a closure of the canal and rings by a large solid mass of cicatricial tissue.

XI.—Nearly a year ago Dr. Cheever operated upon a woman, aged 49, who had an umbilical hernia the size of a cocoanut. It had existed 17 years, and had been irreducible several weeks. Patient confined to a sitting or recumbent position for 8 or 10 months, as nothing retained the rupture without producing excoriations and inflammation of the deeper tissues.

The entire sac was removed by long elliptical incisions. Bowel dark colored. Omentum adherent to ring, which admitted three fingers. Contents of sac returned, and wound closed with one catgut, three button (wire), and several superficial silk sutures.

The patient suffered great pain after the operation, which was only relieved by removing the deep wire sutures.

She sat up in three weeks, and left the hospital in a month. She is now wearing a belt; follows her vocation as a cook, and is very comfortable.

An old woman was brought to the hospital a few weeks since with a moderate sized hernia in the umbilical region.

It was gangrenous, covered with blebs, and the patient was in a partial collapse. She had been ill at least three days, but had had the rupture for years. A very little ether was given; sac opened by Dr. Gay; bowel adherent to ring; latter cut open an inch and a half; healthy portion of proximal intestine stitched to ring; artificial anus made of the gangrenous portion, which included about ten inches. Patient rallied well from operation, and was very comfortable for the remainder of her life. She died in about two months of starvation, due to limited area of bowel surface from which absorption could take place. Resection and suturing the bowel would undoubtedly have ended fatally upon the operating table.

In another case of a large irreducible, scrotal enterocele of long standing, I undertook to do an operation. Symptoms of strangulation had subsided, and gangrene had supervened. The patient suddenly developed œdema of lungs while taking the ether; his bronchial tubes became filled with mucus and serum, and he died before the operation was fairly begun. A cessation of the symptoms of strangulation, that is, pain and vomiting, with persistence of the tumor, means collapse; and I have never seen any treatment do good under these circumstances. Operation is always fatal, so far as I know.

An old man was admitted to the hospital some years ago with an enormous scrotal hernia, which was gangrenous, and had been irreducible for a long time. An opening was made directly into the sphacelated portion, with a view of giving exit to the pent-up gases and other offensive matters. The condition of the patient forbade any further efforts for his relief. He lingered several days, and died from exhaustion.

It will be noticed that in a majority of the above cases the irreducible portion of the hernia was omentum. Sudden strangulation was often due to the descent of bowel behind or alongside of this structure. The frequency of the occurrence forms a strong argument in favor of surgical interference in these irreducible ruptures. They are treacherous affections, and besides being the source of much discomfort from their size, weight, bearing down sensations, and colicky pains, are liable at any time, and with-

out warning, to become obstructed, inflamed, or strangulated, often leading to fatal results. Previous to the introduction of antiseptic methods of treating wounds, the results of operative measures were not very encouraging. As the danger of opening the peritoneum has been very greatly diminished by recent modes of wound treatment, one need not feel that hesitancy in attacking these cases that formerly existed. While experience does not justify us in promising perfect cures in a majority of cases, yet much good may be accomplished by a judicious resort to surgical measures. The tumor may be removed; adhesions severed; displaced organs restored to their normal position; various sorts of pain and discomfort gotten rid of; and the patient's mind relieved of a great and constantly increasing burden. And, finally, by being enabled to wear a truss or other support, he may thus exchange a life of invalidism and suffering, for that of usefulness and comparative comfort.

Dr. H. W. Cushing, of Boston:—My part in this discussion is to present the operative side of the question. The object to be attained is a complete and permanent relief from the affection, to place the patient in a position where he will be permanently independent. I think I can best describe this method by reading the description of an individual operation.

The patient was a boy aged 12, the victim of an irreducible hernia of four years' duration. The operation was commenced by a straight incision, extending from Poupart's ligament over the crural ring to just below the saphenous opening. The sac was exposed and found to contain omentum, which manipulation failed to separate from its adhesions to the edge of the saphenous opening. The sac was then explored from above. In order to do this the upper end of the incision was prolonged outwards, parallel to and one half an inch above Poupart's ligament, making the total length of the wound three inches. By dissecting through the subjacent tissues, the sac was exposed as it entered the crural ring. It could then be freed from within outward by gentle traction, manipulation and dissection, and, after division of the adhesions to the saphenous opening, became easily reducible. I would especially recommend this opera-

ting wound, *i. e.*, the method of exposing the hernia from above and below the crural opening, as giving a much better idea of the exact condition of the anatomical relation of the parts, and the ease with which, if possible, these adhesions are relieved. The sac was now opened with the scissors and the scalpel, and the omental adhesions of the inner surface were divided with considerable difficulty, the omental mass, measuring two inches by one and one half, was then ligated, and the stump pushed back into the cavity. A continuous suture closed the sac, which was then folded on itself, and fixed within the abdomen. The suture affecting this reduction passed through the crural ring, up through the transversalis fascia, the conjoined tendon and aponeurosis of the external oblique. The crural ring was next closed by suturing Poupart's ligament with a quilted suture. The femoral vein was protected with the retractor. When secured, the opening had apparently become impervious. The enfolded sac formed a pad which was firmly fixed against the internal opening of the canal. The pubic and iliac portions of the fascia lata were next sutured in a manner similar to that by which Macewen causes the external pillar to overlap the conjoined tendon in the inguinal operation. The operating wound was then closed. No drainage. Aseptic dressing. The patient remained in bed two weeks, his condition being practically normal during the time. Dressed on the twelfth day. A narrow red line alone marked the seat of the operation. Complete union by first intention. An indurated mass could be felt just above Poupart's ligament. No tenderness. There has been no subsequent treatment. Operation May 14, 1888. The patient, an active restless boy, has been without any apparatus or support since that time. In the opportunities which I have had to carry out the details described, the result has been corresponding to the case reported.

Dr. Walter Ela, of Cambridge:—The irreducibility of a hernia may depend:

(1) On its bulk,

(a) from the presence in the intestines of flatus, fluid, or feces, or,

(*b*) from the enlargement of the omentum or mesentery from the deposition of fat, or,

(*c*) from fibroid or other organic change, the neck of the sac being narrowed by atrophy and the seat of an hour-glass contraction, there being, in other words, a mass disproportioned to its orifice, and doubling up when pressure is applied.

(2) On more or less firm and extensive adhesions of the sac to its contents, or,

(*a*) of the latter to each other, or,

(*b*) by fibrous bands traversing the sac, associated with changes in the shape of the sac or omentum, or,

(*c*) when the hernia is cæcal, when the naturally adherent peritoneum is dragged down and becomes fixed to the tissues into which it is protruded.

(3) On some fresh descent of omentum or bowel, as when the latter is caught between folds of the omentum.

(4) On spasmodic muscular contraction which influences the size of the abdominal rings under the influence of irritation; or, induration of the neck of the sac itself, or of the parts around.

(5) It may moreover be irreducible from other causes than those inherent in the rupture itself by being forced from the abdominal cavity by constant pressure, as by the presence of ascites. When the fluid is withdrawn, the hernia may be reduced. A large old rupture may be too bulky for the now contracted abdominal cavity.

In most cases the prime cause of this condition of irreducibility is attributable to the neglect of proper treatment of a reducible hernia by the use of a truss. When inflammation is set up a hernia may become irreducible in a very few days from adhesions.

An irreducible hernia may be partly reduced, the *intestine* being the part which slips back into the abdominal cavity, and the *omentum*, which cannot be returned.

Irreducible hernia, always a source of anxiety and danger, may produce many inconveniences by its size and weight,

which are aggravated by corpulency or pregnancy. It always has a tendency to increase in size if left to itself.

Even if small, the patient may have a sensation of weakness in the part, and dragging pains in the abdomen.

The objective symptoms if the tumor is large are self-evident; the subjective ones are dyspeptic, as flatulence, nausea, constipation from irregular peristaltic action, perhaps attacks of vomiting, and colic. The tumor is greatly exposed to external injury, and is in constant danger of obstruction and strangulation.

The first symptoms of these are, general distress, vomiting (in later stages stercoraceous), arrested peristaltic action of the bowels, want of impulse on coughing, heat, swelling, and pain in and about the tumor.

Unless these symptoms subside or are relieved, we will have gangrene, and fecal fistula if not collapse, and death.

The severity of the symptoms is in proportion to the distance of the strangulated intestine from the stomach, the nearer the rectum the less distressing the vomiting.

The medical treatment of a simple irreducible hernia should consist of regulating the diet, bowels and exercise. If impaction of feces seems to be an element in the case, copious laxative enemata, aided by the topical application of hot fomentations, with the patient in a recumbent position, will at times aid taxis to a successful issue.

If the hernia is strangulated, however, do not give purgatives, but opium, ice to suck, hot fomentations (or in the early stage ice if more agreeable), and time, but too much time must not be lost in the pernicious plan of temporizing by mild means. Administering medicines does not check the vomiting, but too often the means, at the suitable moment which will more likely arrest it, is rejected.

The palliative plan of treatment of an irreducible hernia, if quiescent and accompanied by no special symptoms, by applying a well fitting binder or bandage with buckles, or a bag truss, or one with a boss, or one with a hollow pad to receive and support the rupture, may be sufficient to prevent its increase and to relieve the patient, whose physical condition or age forbids, in addition, anything further than regulating the diet, bowels or exercise.

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A certain amount of truss pressure is borne on the omentum, and it tends to promote absorption of that already adherent, or to cause a more complete blocking up of the hernial canal. The patient's feelings must be our guide in continuing this.

If a knuckle of intestine slips down also, there may be unusual pain and inability to wear the truss comfortably, and great care must be taken against this.

It is important, and sometimes very difficult, to decide whether the irreducible hernia is composed of omentum, intestine or both, especially if the bowel is strangulated, and often the bowel may be reduced while the omentum is irreducible and adherent, but the latter is of less consequence.

It is to be supposed that taxis has been employed before terming the hernia an irreducible one, and supposing the attempt has been unsuccessful, even under an anæsthetic, and it is desired to make a further attempt at reduction, the following plan is sometimes successful, provided we have the coöperation of the patient, who should be fairly vigorous, and the canal of whose hernia is not reduced to a mere ring.

Long-continued, supine rest in bed, the foot of which is elevated to get inward traction. The patient's knees should be flexed to relax the abdominal muscles. Hot fomentations, or the application of ice (which should not be employed if symptoms of strangulation have existed 24 hours, as it occasions the delay of more important means), are at times grateful and efficacious. The application of sand or shot bags, weights, or elastic pressure to the tumor (which should be supported if pendant) is often beneficial with the other means. This may relieve the congested blood-vessels, and the tension of the sac may be lessened, by pressing the serous effusion it may contain into the peritoneal cavity.

This old method of recumbency and pressure often does well, especially if accompanied by a low diet so as to favor the absorption of fat.

Irreducible ruptures have disappeared spontaneously in the course of a long illness. Dr. F. H. Hamilton has reported many cases in which the mechanical effect of posture and gravitation was to reduce the hernia by inward traction, and more recently Dr. J. Collins Warren has successfully

employed the same means combined with pressure in several cases. If reduction is accomplished (and it is more likely to succeed in the non-adherent omental variety), it is better than hazarding the life of the patient by a doubtfully successful operation, and if successful, the complaint is very liable to return as in Dr. Warren's reported cases of attempted radical cure.

Sometimes, moreover, the reduction of an old, irreducible hernia is a source of great discomfort to the patient, and the reproduction of the protrusion is desirable to obtain relief.

If the irreducible hernia is strangulated, or the sufferings or desirability justify the risk, and other and safer means fail, and the symptoms are urgent, the propriety of operation (which is unsuccessful as far as my experience goes) must be entertained.

Long delay and violent taxis before operation may be even more fatal than strangulation itself. If taxis is used it should be with gentleness and great care, especially if the strangulation dates more than 36 hours. So, the sooner after strangulation, if reduction has been fully tried and failed, the operation be performed, the better.

Often death results not from the operation, but because it was not performed at the right time, and the longer the hernia remains strangulated, the less the chances of recovery.

I have seen death follow in four cases which were reduced by taxis. The return of a small part of inflamed sloughing intestine is the dangerous thing which may set up peritonitis.

If the omentum cannot be reduced, it may be left in the sac, cut off, or a ligature tied around it. Of course the first or the last methods are to be preferred.

Numerous cases are recorded in which a portion of the omentum, in large and unwieldy hernias, has been strangulated by ligature, or in a gangrenous state removed altogether, without producing symptoms.

If on operation there are tough adhesions, interfering with them is attended with great risk of tearing the bowel. It is safer than that, to enlarge the mouth of the sac, and reduce as much of the protrusion as possible, allowing the balance to remain in the sac relieved from constriction.

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Experience and the recorded results of all methods of operation for the radical cure of hernia, and those irreducible in particular, leave much to be desired. Dr. W. T. Bull's report of 134 cases is particularly interesting.

Dr. H. W. Cushing reports a successful case in a boy. Mr. John Wood has seen several cases where adhesions of the omentum at the deep ring have effected a complete occlusion and produced a radical cure. As a rule, if the hernia is irreducible no attempt should be made to effect a radical cure.

To illustrate what I have said, I will mention the following typical cases, most of which I have had to do with:

M. R., a fat woman, has had an umbilical hernia for years, and it is now irreducible. The tumor, which is probably intestinal and omental, is painful, and she has been vomiting for 12 hours. I saw the case in consultation, attempts having been made at reduction. Under ether I reduced the hernia mainly by squeezing together the skin over the tumor, exerting diffuse pressure on the hernial contents. A well fitting band with buckles was more efficacious than a truss pad in retaining the mass within the abdomen.

A. J., a man of 72 years, has had a hernia for 40 years, which has been irreducible for the last 15 years. It was apparently a direct, inguinal one, and as large as a peck measure. Except for its size and weight it has not incommoded him. His penis was obscured in the voluminous hernia. He wore a cloth bag for support, and died recently from an affection in no way connected with the hernia.

A similar case has recently been related to me, where a double inguinal, irreducible hernia had existed for years and years. The man never did anything for it and never wore a support, as it was not a source of great annoyance. He never had strangulation, and died of an affection of the kidneys and bladder.

An interesting case was that of an irreducible umbilical hernia, as large as five fists, which followed the operation of ovariotomy in a woman of 38 years. It was adherent to the skin and was partly omental. A well fitting swathe

alone gave relief. No attempt at taxis was made, as it was not a source of great annoyance.

The case is reported to me of a woman who had an irreducible, unbilical hernia probably omental, which was formerly reducible. She wore a flat shield held in place by adhesive plaster and a band. She had an attack which simulated strangulation, viz.,—distress, vomiting and pain, which subsided on rest, hot fomentations and opium. She had no other attack for three years, when the above symptoms were repeated accompanied by colic. The mass could not be reduced, and she died not operated on with the symptoms of strangulated hernia.

F. A. M., a man of 72 years, entered the Cambridge Hospital nine months ago for a double inguinal hernia. He had had it for 30 years, the right one being larger since a fall 18 months ago. It now measures 21½ inches in circumference. It has always been reducible until now. Taxis is unavailing. He has pain, and tenderness over the tumor and gurgling in it. No nausea nor vomiting. Rest in bed, hernia supported by a swathe and hot compresses. After a few days, the symptoms and size subsided somewhat, and in two weeks he was discharged relieved. It has not incommoded him since, and he pursues his occupation as harness-maker, wearing a bag support.

A man of 70 years, having a strangulated, irreducible hernia, had passed no feces for six days. The principal and important symptom was vomiting, which also had lasted for six days.

Mr. Jonathan Hutchinson made a slight attempt at moderate taxis under an anæsthetic, but from the duration and hardness of the swelling said he would not be reluctant to open the sac. The hernia was reduced and no untoward symptoms followed, and five days later he had a natural movement of the bowels.

A. F., male, 89 years of age, was seen at the Cambridge Hospital with a strangulated inguinal hernia formerly omental, but now secondarily intestinal. Always easily reducible until six months ago, when, having nausea and vomiting, under ether it was apparently completely reduced. A few days later something came down, and has been

down since, but it caused him no pain. When seen at the present attack the tumor was large, tense, very tender, no vomiting, no great pain but some would come at considerable intervals. Vomiting came on attended with more pain, tumor more tense and tender. Aspiration with no result. All thought taxis useless. Operation showed omentum adherent to sac, and a small knuckle of intestine driven behind the omentum was adherent at the neck of the sac. The intestine was returned. The omental adhesions were separated and the omentum tied high up in three parts and excised. Walls of the sac were brought together and drainage tubes inserted, one inside and the other outside the sac, and the wound closed.

He died in three days, failing gradually.

A woman of 52 years with a large, irreducible umbilical hernia, strangulated for 12 hours, had vomiting; tumor tense and hard.

On incising the sac a pint of fluid came away. Gut and mesentery were black. The ring was nicked in four places and gut returned. Then several pails of water were removed from the abdomen (ascites).

A fenestrated rubber tube was inserted and cotton and band applied. Eight days after the patient died with symptoms of peritonitis, which came on only 12 hours before death. The autopsy showed gangrenous gut but not perforated. The cause of the ascites was malignant disease of an ovary.

All the cases of irreducible hernia that I have seen operated on have been strangulated and have died. Operative procedure is very dangerous in this class. It is very difficult in some cases to decide what to do, and it must be left to the best judgment of the attending physician, and even then according to the best rules he may fail.

Dr. F. H. Thompson, of Fitchburg:—It happens that my experience in this special department of surgery, irreducible hernia, has been quite limited. In fact, I can recall two cases only that I think will be of interest. One of them was an enormous umbilical hernia, irreducible, which became strangulated and afterward gangrenous, and

is interesting as representing perhaps the formation of an unnatural anus by nature, and is a case that was reported by Dr. Richardson, at a meeting of the surgical association, two years ago. The other case, on which I operated last Sunday, was an old inguinal hernia in a woman of fifty, of six years' standing. The history is incomplete. The case is doing well, and I shall report it later.

Dr. F. W. Chapin, of Springfield:—I would like to report a case occurring in my own practice, although I know it may not at first appear to have anything to do with this subject, but which the autopsy proved to illustrate one of the dangers in the treatment of incarcerated hernia. I was called one morning to see an old patient of mine, a man about fifty years of age, who had had a hernia twenty-three years. About twelve years ago the hernia was strangulated, and was then reduced. On the morning on which I was called the summons was urgent, and I was told that Mr. C. had got his rupture down and could not get it back. I expected to find a strangulated hernia. When I reached the house I made an examination and found that the hernia was not protruding, but that he had pain in the abdomen in the region of the ring, and had just vomited. He told me he had been out in the yard, exercising in the garden, and lifted something and probably strained himself. I noticed that the left testicle, the hernia being on the left side, was drawn up close to the ring.

I told him to keep quiet, gave him morphine, and waited developments. This was on Tuesday. He continued to vomit during the day, and went on without any movement from the bowels (he had had one that morning), and continued to vomit occasionally, but not severely, and did not develop any fever. The tenderness at the ring diminished, and he did not seem to have much shock. However, I began to feel anxious, and called in counsel on the next night, 36 hours afterward. The testicle had remained close to the ring, and the symptoms of obstruction continued. At that time the vomiting had assumed a slightly fecal odor. We thought that perhaps there was fecal impaction, and used large injections of sweet oil. We continued this during the next day, and finally, Friday night (the case having begun

on Tuesday), he had a very copious dejection of fecal matter which filled the vessel once and a half. On Saturday morning he seemed almost well. The testicle had begun to descend, the hernia protruded—he had a large ring—and it went in and out with the greatest facility. I felt as if the case was all right and was bound to get well.

In the afternoon of Saturday he began to vomit again persistently, and the vomiting became stercoraceous. Thinking there was still further impaction, I introduced my hand and arm into the rectum, passing my hand up as far as possible, even to my elbow. I think I passed beyond the sigmoid flexure, examining in all directions, but I could find nothing. When the question of laparotomy was considered, we thought that he would die in the operation, and nothing was done. The man died on Wednesday, eight days from the time he was taken sick.

The autopsy revealed an old incarcerated hernia, which had been reduced in the sac and had become strangulated inside, a little neck of intestine having been forced into it in addition to what was already there, and the constriction consisted apparently of the peritoneum and the transversalis fascia, the hernia protruding through the ring with the greatest ease, and at the same time being strangulated. All this time he had almost no fever and almost no tenderness.

In another case which I have recently had, of femoral hernia, and on which I operated, the hernia had been down about thirty-six hours. The patient was a woman of about 35. The symptoms of strangulation were not very urgent, except the time, but after using taxis I felt something slip back suddenly, and believed that it was all right, and yet what was left was of such a size that I thought it could not have been all returned. I was unable to make any further impression on it, and decided to operate. On cutting down I found a cyst in the sac wall, as large as a horsechestnut. I opened the sac and found it was empty. After I had reduced the intestine, the cyst of course could not be reduced. These cases, although perhaps not strictly connected with the subject, may be interesting.

DR. J. COLLINS WARREN:—There are several points which have presented themselves to me in the papers of

these gentlemen. In the first place, I would not like the impression left upon their minds that I would not favor operation for hernia. What I meant to say was, that a certain class of cases, perhaps less numerous now than I should have regarded them ten years ago, could be treated with advantage without operation. I think it is valuable for the general practitioner to be aware of this fact, that it is within the power of every physician, whether he is a specialist in this department of medicine or not, to treat a certain number of these cases and give his patients great satisfaction. No especial apparatus is required. All that is necessary is to persuade the patient to go to bed and stay there for from two to eight weeks on his back, with the bed tipped up, with pressure from sand-bags or shot-bags, or from bandages. In that way he can reduce the hernia down to one-third of its original size, and then, if he does not wish to try the method that Dr. Galloupe and myself spoke of, he can give his patient ether and can push back through the ring the few remaining nodules of omentum which have not already been reduced. Some kind of truss will be satisfactory, without operation.

There are, however, of course, a large number of cases of irreducible hernia which can now be treated much more satisfactorily by the operation for radical cure, even though the patients do not stay cured; even though they are unable to do without some form of apparatus, still they are in a very different condition from what they were before. They are like the average man with a reducible hernia; they go about, and do what everybody else does. I would not be considered as saying that the radical cure is not a radical cure. We have not perfected the operation yet. It is not, in the majority of cases, I think, a radical cure. There is a large number, and an increasingly large number, of cases where the radical cure does probably take place, but the group of cases which Dr. Ela alluded to, those that Dr. Bull reported (and perhaps there is no more skilful operator than he), shows that there is a very large number of cases where radical cure does not take place. When we can all carry out great care and great nicety, such as Dr. Cushing used in his operations, perhaps we shall get more satisfactory results. There is a good deal, of course, that can be

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said upon this subject, but that is hardly the topic of discussion this afternoon. I merely wish to place myself in proper position upon that point.

There is another point to which I would like to refer again, and that is the statement that I made that large irreducible hernias did not become strangulated. You have since heard mention of several cases of strangulation. But these are not exactly what I meant by large irreducible hernias. I mean the largest variety, where four fingers can be put into the ring. In such cases I think you will find that authorities state, and certainly it is my experience, that strangulation is exceedingly rare. It is more likely to occur in large umbilical hernias, I think, than in large scrotal hernias. Perhaps some sudden addition of intestine to the contents may bring on strangulation. Certainly in umbilical hernias of considerable size I have seen strangulation.

DR. C. W. GALLOUPE:—I would like to add, in reference to what Dr. Warren just said, that I have seen a patient, a large woman, weighing 300, with an enormous umbilical hernia. It has been three times strangulated. I worked over it a quarter of an hour, and it became smaller. It increased suddenly, and yet the new accession had been reduced rapidly, and everything was all right. I have not been able to get a sand-bag on it yet, as I want to do. It remains about the same size, except that the accessions occur and disappear again.

One statement that I made I should like to explain a little. In speaking of manipulation of these tumors being necessarily gentle, I do not mean that a good deal of force should not be used, because it can be used. After the strangulation is reduced, the bowels being mostly out of the way, and the chief obstacle being adhesions, a great deal of force can be used. I have seen Dr. Warren use a great deal of force with the best results, and in these cases I do not see why the time should not be shortened very much indeed, —instead of giving it two to eight weeks, giving two weeks, then administering ether and applying a great deal of force. But this should be applied gently. Gentle force does no harm at all in these cases.

The case that Dr. Chapin reported, there being a cyst in

the case of hernia, was somewhat parallel to that which I reported, where there was a fibrous growth some two inches beneath the ring. I could reduce that, but it would pop out after the patient was about. That case of Dr. Chapin I believe would lead us to think that we need not be too particular about returning every part of the hernia, if the essential part is returned.

Dr. H. W. CUSHING :—I do not think that the method by operation has received the proper amount of attention. There is a large number of cases in which operative treatment, properly carried out, according to the methods which we have now at our disposal, is decidedly advantageous, especially in the case of children and young adults. It enables the patient to select the most comfortable time for such a procedure, and have it done under the most favorable circumstances. It is quite a different state of affairs that we get when the hernia becomes strangulated, for then the operation has to be performed under the most disadvantageous conditions. The advantages which are obtained are very great, especially where the patients are either children or young adults. If the operation is successful, they are rendered practically independent of apparatus the rest of their lives. Then, if the operation is unsuccessful, so far as a radical cure goes, the patients are placed where they are much more comfortable, and can be much more efficiently treated by apparatus. If the early operative treatment were to be adopted, I think these extreme cases which are to-day coming up would cease to appear. I would not defend a system of reckless surgery, but I think that many of these cases would be placed in circumstances where they could be much more satisfactorily treated than if allowed to continue untreated surgically.

The Chairman, Dr. D. W. CHEEVER, of Boston :—The case of Dr. Chapin, which was a very interesting one of strangulation of the sac, will be found depicted and described in Astley Cooper's great folio, and he recognized, I remember, as one of the distinct perils, that, although we may have cut up the external structures and think we have relieved the strangulation, there is still liable to be a pinch

in a certain number of cases, high up in the sac itself, and hence the rule that the finger should be passed into the abdominal cavity and freely pushed about, to be quite sure that no nipple, so to speak, of intestine, remains, which is not perfectly free from adhesions.

With regard to the size which these hernias sometimes attain, it is interesting to recall the case, considered classical, of Gibbon the historian, the pyloric orifice of whose stomach was outside the external abdominal ring, and all the stages of his alimentation were carried on in a bag between his legs. That again is a good illustration of the fact that when a hernia becomes large enough it ceases to be very dangerous. The application of the bag is very comfortable in a good many cases. I have had several such. I have one still under observation which I have been knowing to for between fifteen and twenty years. The patient gets about and leads a fairly active life. He has had no great discomfort, and has reduced his hernia considerably by the aid of a small bag which is trussed up in various directions by three or four straps of elastic webbing. In that way he can adjust the pressure, and gets on comfortably. In another case of a large hernia, where, on account of the obesity and age of the patient, and impelled also by the comfort with which this other man had gotten on, I advised a similar bag, the result was not so good. His history was interesting as illustrating the danger of these cases. He went on a journey, and was returning on the night train. The train stopped for a few moments at one of the stations where refreshments are taken with lightning rapidity. While he was eating, the train started, and he ran to catch it. He succeeded in catching hold of the rail, and at the same time felt a severe pain and an additional increase in his hernia. He got into his berth and rode all night in agony. Then he went a little farther to reach his own home. He developed symptoms of strangulation, gangrene, and died while he was being operated upon to relieve the strangulation.

These are two cases which are typical—one perfectly comfortable on account of the care which the man takes, the other dangerous on account of the want of care which the man took at that moment. That seems to me to prove

that these cases are never very safe. The measures of treatment, according to the papers we have heard read, seem three. One is to carry the hernia in a bag. The second is compression, which certainly is very successful and perfectly safe, and depends for its success, apparently, upon the patience of the victim of the hernia, who is willing to lie in bed, and the perseverance of the surgeon. The third is operation.

Now of course we shall all agree that the majority of these hernias, in the laboring classes, where they exist most frequently, do not present themselves to the surgeon until they have stoppage. Patients go about with them; they work with them; they do not mind a little difficulty, a slight attack of pain, but when they present themselves to the surgeon or the hospital it is because they have already strangulation. In these cases we have no opportunity except to operate. The cases that have been read show that the percentage of recoveries from operation is very large. Few die. Those who do, die because the bowel is already sphacelated by pressure. Almost all of them recover, and they recover with the opening closed up temporarily, if not permanently. They can work, and, if they are not cured, at any rate they are relieved so that they are perfectly safe.

It was thought, in bringing this subject forward, that the subject of irreducible hernia would elicit just that class of papers which it has brought out, and which I think are very valuable. We all know what to do for strangulated hernia; everybody knows the symptoms, and no one hesitates to use the knife, but it is this class on the border line, which are not severe enough to demand operation, to which various modes of treatment may be applied.

With reference to two of the cases mentioned, which Dr. Gay reported, where the sutures came out, I contrast them with the case of Dr. Cushing where such an admirable result was gotten after prolonged sewing up of the various tissues, and I cannot help thinking that the age of the patient has something to do with the result. My patients being 62 and 68 years of age, their powers of resistance were small. I cannot think the cutting out of the sutures was due to the material used, because the same silk, prepared in the same way, was used in two other cases, and

remained permanently in position for a period of many months. I think the age of the patient is a great factor in the chance of permanent recovery. I, too, was very much impressed by the statement of Dr. Bull, in which he gave over sixty per cent. of relapses in 134 cases, operated on in four different ways.

ARTICLE V.

EPIDEMIC INFLUENZA AND INSANITY.

By ARTHUR H. HARRINGTON, M.D.
OF DANVERS.

READ JUNE 10, 1890.

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EPIDEMIC INFLUENZA AND INSANITY.

When I had the honor of receiving an invitation from the Chairman of the Medical Section to present a paper at this time, it occurred to me that it would be pardonable if I referred to some cases which I reported a few weeks ago at a meeting of the South Essex District.

These cases, which are instances of Insanity developing together with or after an attack of the Influenza, may be of interest to you, considered as one of the phases of the recent epidemic. In addition to the original paper, I have, through the kindness of a number of medical gentlemen, been able to obtain some useful material upon this subject, so that we shall have for our consideration the observations of others, rather than mine alone.

In looking over the history of the various epidemics of influenza, we find careful descriptions of the thoracic, the abdominal and the nervous types of the disease. Under the latter are included the general nervous or cerebral disturbances. Now such cerebral disturbances as headache, insomnia, somnolence, delirium, &c., receive attention, but in the literature which I have been able to consult the statements touching upon the purely mental disturbances or psychoses are of a most general character. And this is my reason for presenting this subject somewhat in detail and mainly from a clinical standpoint.

Before taking up these cases, if you will allow me, I should like to remind you of the limitations to which one is subject in attempting to assign the cause or causes of insan-

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ity in a given case. Probably in this class of affections the predisposing causes play a more prominent part than in almost any other. This fact is often overlooked, no doubt, and many times what are put down as the prime causes are really only the secondary or exciting. Moreover, it is rarely that a single cause can be fastened upon and held responsible alone for the mental disturbance.

These considerations have been kept in view in studying these cases, as complete a previous history as could be gained was taken of each, and it was found that of the cases at the Danvers Hospital, with one exception—and in this instance the previous history was not ascertained—there existed predisposing causes, congenital and acquired, but it seemed quite certain that the attack of influenza, with its febrile symptoms, its tendency to cause great physical and nervous depression, was the final weight which turned the scale.

It was found that a classification based upon the previous histories could be made, into which the cases fall quite naturally. This classification is not an essential one, but is made to facilitate our easy comprehension of the cases.

I will state that I am indebted for the data of the female cases to my colleague, Dr. M. A. Jewett.

Cases I. and II. are instances in which the patients had been insane, but had recovered. An attack of the influenza seems to have been the exciting cause of another attack of insanity. Case I., a female, æt. 60, has had two attacks of acute mania, treated at the Worcester and Danvers Hospitals. She was well mentally and living with her family when attacked with the influenza, Jan. 10th. She very soon became restless, confused, passed into a maniacal state, and was admitted to the Danvers Hospital ten days later, where she died after a few days from exhaustion. Case II., a female patient, æt. 23, has had one attack of acute mania, from which she recovered. She was attacked with the influenza, and soon afterwards maniacal symptoms appeared.

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She was admitted to the hospital Jan. 9th, where she continued in an acutely maniacal state for four days. At the end of this time her maniacal symptoms subsided and she became quite rational. A month after admission she appeared to have made a complete recovery. This attack must be regarded as presenting all the motor excitement of acute mania, but the delirium which the patient exhibited was more like that of an acute febrile disease. Attention is called in this case to the prompt recovery which began with the subsidence of the acute bodily symptoms.

Cases III., IV., V. and VI. are instances in which there had existed, for longer or shorter periods, enfeebled physical conditions from various causes, and which were very likely preparing the way for a mental breakdown, but in which the influenza seems to have been the exciting cause of the attack of insanity.

Case III., a female, æt. 30, has had symptoms of phthisis for two years, and last July had a severe attack of pleurisy which weakened her very much. In addition to these debilitating causes she has been nursing her child for twenty months. Her friends state that she was completely run down, but never showed any signs of insanity until attacked with "The Grippe," when she became restless, sleepless, then maniacal, refused nourishment and resisted attentions. She died from exhaustion and capillary bronchitis, 19 days after admission to the hospital. In this instance doubtless phthisis, pleurisy and prolonged lactation were contributing causes to an attack of insanity which was precipitated by the additional depressing effects of the influenza.

Case IV., a domestic, æt. 25, has been feeling "poorly," nervous and debilitated for two months, and left her place on this account. She was attacked with the influenza, and was sent to the Boston City Hospital, where she became frightened, thought some one was going to kill her, and tried to jump out of the window. She was sent to the Danvers

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Hospital, where she was restless and stubborn for a time. At the end of a month she was better, though somewhat confused and dull. She was discharged four months after admission. Her progress had been slow, but steady, and she left the hospital with a fair chance of making a complete recovery.

Case V., a male, æt. 30, a native of France, has been in the country a few months. When attacked with the influenza, he developed hallucinations of smell, detected a strong odor as of some poisonous substance on his pillow, thought that his landlady was attempting to poison him in order to get his money. He became frightened. In order to attract the police and get protection he broke his window, shouted for help and fired a pistol into the street. He was committed to the hospital Dec. 30th. He was weak and emaciated, and aside from the pulmonary symptoms of the influenza he was thought to be suffering from phthisis. He was quiet and polite on admission, but during the evening attempted suicide. The next morning he regretted his action, but confirmed the delusions mentioned above. As he recovered from the influenza the hallucinations of smell disappeared, and two weeks after his admission, while he recognized his actions and many of his ideas as foolish, yet he was not able to dispossess himself wholly of the belief that his landlady had attempted to poison him. This belief remains like a "fixed idea," and it is not unlikely that in this instance the attack of influenza was the exciting cause of a mental disorder which may become chronic.

From a psychological point of view this case is very interesting as showing the apparent origin of the delusional ideas in the hallucinations of smell, these latter or at least disorders in olfactory sensation and perception being not an uncommon symptom connected with the influenza.

Case VI., a gentleman, æt. 60, was thought to have had a slight apoplectic attack two years ago. His physical

health from that time has been poor, and he has been subjected to severe mental strain and worry growing out of business affairs. He was much prostrated by an attack of influenza and did not gain strength again, and after three weeks he began to show signs of mental derangement and was sent to the Danvers Hospital. This case proved to be an excellent example of Acute Confusional Insanity—a form which will be referred to again. The patient's death, which occurred in three weeks after admission, was due to exhaustion and capillary bronchitis.

Cases VII., VIII. and IX. were individuals evidently belonging to a well-known class; the characteristics of its members are, that they are the possessors from birth of a bad physical organization and are of a low grade of intellect. Such persons often break down mentally early in life, from comparatively slight causes.

Case VII. was a boy, æt. 17. His mental disorder was that of acute confusional insanity. He made a rapid and complete recovery, and was discharged in a few weeks.

Case VIII. This was another instance of acute confusional insanity, in a young woman æt. 25. Her mental symptoms cleared up to a great extent, but she could not be said to have recovered fully when discharged. In the last two cases the mental disorder developed while the subjects were suffering from the acute effects of the influenza, and with improving health the mental condition improved also.

Case IX. In a colored woman, æt. 25, an attack of the influenza was followed immediately by acute mania. She was admitted to the hospital, and died very suddenly. A post-mortem revealed cardiac thrombosis.

Cases X. and XI. taken together are interesting. At various times they had been given to the excessive use of alcoholics. An attack of the influenza seems to have given rise to certain mental symptoms which are sometimes ob-

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served after prolonged drinking. Case X., a male, æt. 51, has been a periodic drinker for years. When getting over a drinking spell he would almost always have a period of profound depression, and would be suicidal. During one of these periods in 1886 he came near destroying himself by cutting his throat, and was at the Danvers Hospital for a time. He was admitted again Jan. 1st, 1890. The statement was that he had been working steadily, for several months, up to the time of his attack of influenza, and his friends asserted that he had not drunk of late. While suffering from the influenza he grew sleepless and despondent, took no nourishment, then became violent and suicidal. After coming to the hospital he remained greatly depressed. His death occurred after a few days from capillary bronchitis and cardiac complications. The point to be noticed in this instance is that an attack of great mental depression with suicidal tendency, exactly like the attacks which followed his periods of excessive drinking, developed simultaneously with an attack of influenza.

Case XI. A young man, æt. 27, has been in the habit of drinking a good deal, but has never been affected by it mentally. Was attacked with the influenza and confined in the house for ten days. During this time he had no liquor, but hallucinations of hearing began to trouble him, and disturbed him to such an extent that he was sent to the Danvers Hospital. The committing physicians also stated in their certificate that they thought his mental trouble due to the "Grippe." As soon as this patient began to improve physically his hallucinations wholly disappeared. Hallucinations of hearing, as we all know, are a very common result of prolonged drinking, but this patient seems never to have suffered from them until attacked with the influenza. In this instance the use of alcoholics had probably made the conditions favorable for the development of hallucinations, and the acute illness seems to have been their exciting cause.

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In a recent report of eleven cases of insanity after influenza, by Kraepelin, he cites a case in which a man who had been addicted to alcoholic excess developed a typical delirium tremens when attacked by the influenza.

Case XII., the only one of the cases seen at the Danvers Hospital whose previous history was not ascertained, and in whom no predisposing cause of insanity was found, was a case of acute confusional insanity. He made a complete recovery in a few weeks.

In making a few general remarks upon these twelve cases I will say that the physical as well as the mental symptoms were of a very marked character. The patients, when admitted, had the facies of an acute exhausting disease; there was the great depression of the physical forces and the acute bronchitis with a profuse muco-purulent expectoration which characterized the epidemic disease. As for the mental symptoms, out of these twelve cases four were excellent examples of acute confusional insanity, and six of the remaining cases presented some symptoms which would remind one strongly of that type.

By acute confusional insanity is meant a form which resembles acute mania, and as far as outward appearances go might readily pass for acute mania, but at the bottom of which there is no emotional disturbance as in acute mania, the conceptional sphere is dimmed, consciousness is blurred, and patients recovering have a crude recollection of their condition. When hallucinations predominate this is called by some "acute hallucinatory insanity." This form most often developes on the basis of acute, exhausting and depressing diseases, the very factors which were present in the cases which have been cited and which would account for their general leaning towards the type of acute confusional insanity.

Of these twelve cases those which recovered or improved did so promptly as soon as the physical condition improved.

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The mortality in the twelve cases named was large and was due to the exhausted condition of the patient, together with cardiac and pulmonary complications.

The study of these twelve cases led me to a desire to learn the experience of other hospitals during the recent epidemic. Accordingly I sent out a number of circular letters, and I received replies from the Superintendents and Medical Officers of twenty-two institutions. I desire to express my thanks for their courtesy in answering my questions so promptly and carefully.

The letter comprised six questions, and the replies were both negative and affirmative, and I will give the sum of them very briefly.

First Question: In how many cases of insanity has the influenza been regarded as the exciting cause?

In ten hospitals out of the twenty-two no cases had been observed. In the remaining twelve hospitals the aggregate number of cases admitted, thought to be due to the influenza as their exciting cause, was thirty-six.

Second Question: In how many of these cases has the influenza been the only assignable cause? The answer was sixteen out of the thirty-six.

Third and Fourth Questions respectively: How many cases have recovered, and how many have died? Twelve had recovered and two had died out of the thirty-six cases.

Fifth Question: What forms of insanity have been observed? I give the diagnoses of course just as I received them, and for convenience will include here the twelve cases of the Danvers Hospital. So that out of forty-eight cases seventeen were acute mania; fourteen acute melancholia; five primary confusional insanity; two each of simple mania, simple depression and delusional insanity; one each of acute delirious mania, acute febrile delirium, acute dementia, senile mania, apoplectic dementia and alcoholic dementia.

Sixth Question: Have the mental symptoms as a general

thing presented any peculiar features due perhaps to the influence of the epidemic disease? The answers to this question quite generally bore out some observations of my own. Among them I will quote the following:

Dr. C. M. Hay, of the State Asylum at Morris Plains, says, "Generally the insanities in these cases have been of a very marked type, but whether this was due simply to the exhaustion in which the mental affection found them or was connected with a specific toxæmia I cannot say." Dr. Cowles of the McLean Asylum states, "I do not know that the mental symptoms have presented any notable peculiarity except the tendency to prompt recovery as if upon the abatement of some debilitating or depressing influences."

Another question which might have been asked, viz.: What effect has the influenza had upon those already insane when attacked by it? was suggested afterwards by a report of some cases by Dr. Paine of the Westborough Homœopathic Hospital and which appeared in the *Boston Herald* of April 24th. I have been referred by Dr. Paine to this report, so I take for granted that he was correctly quoted. Dr. Paine, you may remember, reported some cases suffering with chronic forms of insanity who recovered mentally after an attack of the influenza, to which he attributes their recovery.

Unfortunately of the 30% of the insane population at Danvers Hospital who suffered from the influenza none seemed to be cured by it. In fact the mental symptoms were augmented rather than diminished even, remarkably so in four cases.

Dr. Lyon, of the Bloomingdale Asylum, says, "I may add that I have seen no such remarkable cures from chronic insanity or any other form, effected by the 'Grippe,' as I have read of." Dr. Park, of the Worcester Hospital, says, "We have had no cases of recovery from chronic mania due to 'Grippe.'"

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CONCLUSIONS:—This paper has not aimed to gather the statistics of the relation of the recent epidemic of influenza to insanity. This would be a difficult and uncertain task. It is quite likely that in many places attention was not given to the subject, and the most that can be learned will probably be found in the annual reports of the institutions when they shall be issued. But taking the cases of the Danvers Hospital and those reported from other hospitals, we have forty-eight cases in which an attack of the influenza was followed immediately or in a short time by the development of a psychosis. In thirty-one cases the influenza acted as an exciting cause to insanity, predisposing and other exciting causes being clearly made out. In seventeen cases the influenza was the only assignable cause of insanity. I incline to the belief that if the antecedents of these seventeen cases could be thoroughly analyzed, this number seventeen, in whom no predisposing causes were known, would be diminished and that we might approach nearer a conclusion made by Kraepelin, viz.: that the influenza alone is not sufficient to occasion the development of a psychosis.

Of the total forty-eight cases, sixteen recovered. Considering that in hospitals the average number of recoveries in new cases is only from 15% to 20%, the recovery of 33% of these cases is worthy of remark.

Cases of insanity excited by the influenza have shown a greater tendency to prompt recovery or improvement than is usual in recent cases. In most instances the improvement has been coincident with the abatement of the acute bodily symptoms and the return to physical strength and health.

Finally, out of these forty-eight cases, while I cannot include them all in a classification, yet it is quite easy to recognize three main groups, viz.:

1st. Cases of simple depression and hypochondria. Many such instances were no doubt seen by those in general

practice during the epidemic, but in which the mental disturbance did not proceed far enough to demand hospital treatment.

2d. Cases in which the emotional disturbance was carried farther than in the first group, resulting in acute forms of mania and melancholia.

3d. A considerable proportion of cases which developed on the basis of bodily exhaustion and depression of the nervous forces, viz.: the cases of delirious mania, febrile delirium, and especially those of acute confusional insanity, which appears to me to be the type towards which the symptoms in many cases have inclined.

DISCUSSION.

THE CHAIRMAN, DR. A. H. JOHNSON, of Salem:—The recent epidemic was of such a character that we think it might be as properly called epidemic-nervous, as epidemic-catarrhal fever; and every practitioner observed such a variety of nervous pranks and mental disturbances that very probably many of you have some contribution to make to this paper from your own experience.

DR. WALTER CHANNING, of Brookline:—I was much interested in hearing this paper by Dr. Harrington and these data which have been more or less incorrectly reported elsewhere. Apparently no very well defined form of insanity has followed the influenza. This seems rather a pity, because we might more easily connect it as a proper cause. Cases of confusional insanity were most characterized in cases of exhaustion. We should expect a form of acute febrile delirium, or delirious mania rather than anything else. I think the total number occurring is rather small. I should like to know the exact number.

DR. HARRINGTON:—I do not know.

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DR. CHANNING :—The total number seems to be small, where the influenza was the sole exciting cause. The percentage of recoveries is small also. Dr. Harrington's estimate of the percentage of recoveries in the cases of insanity is small—15% to 20%. I think it should be 30% to 40%. In these cases occurring from an acute form of disease like influenza, I should expect the percentage to be larger than in the average percentage of cases of insanity. This study shows the difficulty of tracing causes of attacks of insanity. We see in Asylum reports, this, that and the other thing assigned as a cause; but we get as a matter of fact little information from these statistics.

We find from the data in 22 asylums, only 16 cases where the influenza could be assigned as the true exciting cause. That seems a small number of cases, but if we had the total number, it would throw more light on the subject.

DR. T. W. FISHER, of Boston :—I think Dr. Harrington has done good work in making a study of these cases. He has included in his list a very few cases from the Boston Lunatic Asylum that I furnished, so that I will not say much about these. I will allude to my experience in the hospital with the influenza. It is peculiar that insane patients enjoyed immunity from that disease, while the medical staff and employees suffered from it in a more or less aggravated form, the insane having more or less immunity from other nervous diseases and being more protected from atmospheric changes. The characteristics of the disease as nervous, were fully illustrated among the employees and medical staff. The severity of the nervous symptoms is underrated even by physicians. I had occasion to differ from a very good physician in Boston, in the diagnosis of the condition of one of my medical assistants. He examined him and he was inclined to give a discouraging prognosis. Though the symptoms were severe, with throat and lung trouble, I concluded that they were only of nervous origin, and the result proved the correctness of my diagnosis.

The form of insanity in two cases which could be wholly attributed to influenza, was the acute delirious form, as

might naturally be expected. All these cases recovered. One would expect that the influenza would be a prolific cause of insanity. I am not surprised that more cases were not admitted to the insane hospitals.

DR. WHITNEY, of Pawtucket, R. I. :—How general the use of antipyrin was during the epidemic of influenza, I do not know. But I saw in papers that a great deal was used in Paris. I do not know of any other city in the world where so many died of the influenza. Now Dr. Harrington unfortunately knows nothing about the treatment of these people anterior to their admission to the hospital. I want to say that if they had antipyrin, which is a debilitating remedy, it would account in my mind for their being there.

DR. H. R. STEDMAN, of Boston :—I think the great value of Dr. Harrington's paper lies in the fact of the emphasis he gives to exhaustion as a cause of insanity. It is not often that you can put your finger on a single exciting cause of insanity. He said that in confusional insanity, in mania and paralysis, exhaustion is a very prominent exciting cause. But without such papers as this I do not think it would be so characterized.

ARTICLE VI.

THE CARE OF THE INSANE IN LOCAL INSTITUTIONS.

By ALBERT R. MOULTON, M.D.
OF BOSTON.

READ JUNE 10, 1890.

THE CARE OF THE INSANE IN LOCAL INSTITUTIONS.

THE term insanity has included a great variety of abnormalities in different ages, and with the increasing light of scientific research will probably be made to embrace many forms of disease not so classified at present. As the terms morality, virtue, crime and luxury convey a dissimilar meaning to the people of different localities and countries, and to the same people at different periods, so the term insanity in its common acceptation depends upon the age and the people.

Without attempting to define the term, the condition referred to in this paper as Insanity is that in which the individual at the time is not considered responsible for his acts, and in which his liberty may be interfered with; or which to the popular mind comprises insanity.

Tradition, superstition, fanaticism and custom cling with almost unrelenting tenacity, influence our lives, and their effects disappear, if ever, after many fluctuations, by being overwhelmed with truth and reason. When certain improper conditions in any branch will be replaced by rational methods depends upon the time when the subject is approached in a broad and scientific manner, born of intelligent experience.

The early settlers of this country copied many of the usages of the old country, not neglecting religious intolerance even, and the mistakes which were made on the British Isles and elsewhere across the water were repeated here, almost as a matter of necessity. The methods of dealing with the insane which our forefathers borrowed, and which

they applied according to their light, as has every succeeding person, were crude, not to say cruel; for the reforms of Pinel and Connolly, who viewed the conditions with the eyes of prefessional experience as well as philanthropy, had not permeated the masses, and never during the time of those reformers was there asylum room for all the insane of their communities, most of whom were dealt with by laymen; therefore it was not the example of such physicians that our ancestors followed, but that which for long centuries had been set by incompetent and mistaken men, which, if ever studied a moment, was supposed to be rational and proper, and which is still influencing a large number of citizens in the treatment of many insane men and women. When this subject is studied, it is apparent that two methods of dealing with the insane have long been in vogue: by one they are treated as sick people, by the other as criminals or paupers; in one instance they are placed under the fostering care of the State, in the other their management is often sought by those inheriting the penurious and selfish methods of local politicians, or they fall into the care of well-meaning but incompetent persons. The results have been the same in all time, as I shall endeavor to show.

Tuke, in his "Insanity in Ancient and Modern Life," shows how it is probable that causes were in operation to occasion mental disease in pre-historic times; and if existing and recognized it must have had some sort of attention bestowed upon it, as was the case later. To that writer, also to Esquirol, Sibbald, Folsom and a few others, are we much indebted for valuable contributions upon the history of the early treatment of the insane; and to the gentlemen mentioned, as well as to Shew and Letchworth, do I make acknowledgment. Forms of insanity are portrayed in the Old Testament, and not infrequently spoken of in the New. David feigned insanity and betook himself to a cave. Jesus caused the unclean spirit to depart from a man who had been

possessed, and who had spent days and nights in the mountains and tombs, crying and cutting himself with stones. He had often been bound with fetters and chains, which he always broke. It can reasonably be inferred that insanity was not considered really a *disease*, for Christ gave his disciples power against unclean spirits, *and* to heal all manner of disease. Probably the Greeks and Romans treated some of the insane in rooms adjoining their temples. Homer makes a single reference to the subject of insanity; and the dramatic writers of that time admirably described the disease. Euripides portrayed the insanity of Orestes, caused by having murdered his mother. He suffered from melancholia, followed by mania during which he had hallucinations of sight and hearing. When he fell exhausted, the herdsmen tried to stone him, and he was protected by a friend. The Athenians who lived as early as the fifth century before Christ treated the insane with intelligence. A father suffering from insomnia and with increasing delusions of grandeur was the source of much anxiety to his son, who, after using moral suasion, which failed, had the patient bathed and purged. Fearing that he would escape, he was kept locked in his room under the care of a servant.

Among the stories told by Athenæus is one of a young man who had delusions of wealth; he was not a general paretic though, for under the care of a physician he recovered. Hippocrates regarded mental derangement somewhat in the nature of bodily disease, and Sibbald shows that the most cultivated intellects of Athens concurred with him.

The priests, among the ancient Egyptians, treated the insane by what we now term "moral" means; useful occupation and pleasant diversion, while the ceremonies attending the treatment of the insane at Gheel during its early days were as impressive upon the patients as those indulged in by Christian Scientists, Mind Curers and other quacks of the present day.

We are informed by Dr. Cowles, in his chapter upon Hospitals in "The Reference Hand Book of Medical Science," that "the first hospital for the insane on record was founded A.D. 491 at Jerusalem, and such asylums were established by the Saracens at a later period." During the dark and troublesome Middle Ages the insane suffered much; the intelligent and humane treatment which had been taught and practised "by the learned priests of Egypt, and later by the great philosophers and physicians of Greece," was lost sight of, and the insane came to be regarded as criminals and outcasts, and were treated accordingly, or if accused of being bewitched were burned at the stake. How many actually insane suffered such tortures will never be known. Says one historian, "it has been estimated that in Europe during the fifteenth and seventeenth centuries more than one hundred thousand persons were convicted of witchcraft and were burned, drowned or hanged. "In England," says Sibbald, "during the first eighty years of the seventeenth century, the number executed has been estimated at five hundred annually, making a frightful total of forty thousand. According to the proportions which are furnished by the statistics of insanity at the present day, a population such as that of England in the seventeenth century would have furnished about two thousand persons annually who would, according to our present views, have been placed in asylums"; and he makes the deduction that a proportion of nearly one out of every four persons who would now be sent to an asylum were burned as witches. During the epidemics which culminated in Essex County in 1692 (which never made any headway in the Plymouth Colony), but twenty-five persons were executed. None were burned in America because of this delusion.

Whipping posts were common in England in the reign of Henry VIII., and Tuke refers to the fact that wandering lunatics were whipped. He has "no doubt" that "in addition to

branks [gags] and whipping-posts, the pillory and stocks, and probably the ducking stool, were made use of for unruly and crazy people who nowadays would be comfortably located in an asylum."

Asylums were established in England, Spain and elsewhere, which were under the charge of monks, or were in reality prisons, subject to no supervision, where the treatment was naturally barbarous and inhuman. It was generally imagined that the insane were possessed by demons, and dungeons were provided; unnecessary restraint was used, and the unfortunate inmates were subjected to all manner of abuse; they were looked upon as little superior to beasts, and were often treated worse than criminals at the beginning of the nineteenth century. Pinel, the alienist, after being long resisted by the Commune, finally got permission in 1792 to try his experiment, and he loosened the chains and bonds from numerous ill-fated inmates. William Tuke, in 1796, at the York Retreat, then just opened, renounced the use of chains and manacles in the treatment of the insane.

Connolly, in 1839, followed his example, introduced the system which spread over England and Scotland, at a time when Woodward was performing equally as good work in Massachusetts. Letchworth in his recent work "The Insane in Foreign Countries," after specifying certain barbarous methods of restraint in use at Bethlem, remarks, "That cruelty of the kind described should have been possible as recent as the year 1815, twenty-five years after Pinel's great reform in France, and after Tuke's introduction of humane principles at the York Retreat, is almost beyond belief." Such a state is fully accounted for by the fact that, at the time spoken of, Bethlem was nothing more than a prison-hospital, having no resident physician, where governmental supervision had been successfully resisted by the local management, and which was not effected until 1853, when the old régime was swept away and a new order of

things introduced, which has made it one of the best hospitals in the world, directed by resident physicians and periodically inspected by public officials (other than its board of managers) as should be every place where the insane are kept. It will be shown that improvement and reform have been as slow of adoption in this country at a more recent date as was the case in England at the time spoken of, and that the insane receive a full measure of justice only when treated by those who make their disease a study.

As the Biblical idea regarding insanity obtained for many centuries, so other false notions continued beside those of custody. Dr. Rush, in 1783, deemed it advisable "when visiting an insane person to first look him out of countenance," a procedure which some, unacquainted with insanity, still imagine necessary to attempt.

It was generally supposed there was an exacerbation of excitement at the full of the moon, an idea of great antiquity, and one which has such a hold that it effects even the titles of hospitals and makes standard a legal appellation.

That insanity can be diagnosticated by some appearance of the eyes of the patient (what I know not) is still a common belief.

Thus I have referred to a few of the circumstances, customs and traditions which greatly influenced our ancestors in dealing with this subject, and they should be kept in mind when attempting to give a reason for the methods and theories long ago adopted, very many of which are still entertained by individuals who have not had an opportunity of correcting them, or upon whom superstition, credulity and love for the marvellous have a strong hold.

It is the theory of the layman which the layman adopts, especially so in a land with few papers and poor communication; hence in the early history of this country the insane were naturally treated as criminals and outcasts. Only the demonstrative forms of the affection were recognized (not

generally as disease), and those suffering from it were consigned to almshouses and locked up in jails, where they were long forgotten, while the quiet and demented wandered about the country. Understanding these natural circumstances and their causes, one is not surprised at the conditions, for the *people* knew no better method, but can feel nothing save admiration for those who recognized the mistakes that had been made, and through whose efforts reformation was begun.

In Massachusetts, to Horace Mann more credit is due than to any other person for arousing public sentiment which demanded humane treatment of the insane. Largely through his efforts the first State hospital was established (opened in 1833) of which he became a trustee. It was intended to have the Commonwealth assume the whole care of the indigent insane, and to the hospital were sent insane from almshouses and prisons in such numbers that within a year the institution was overflowing, and to make room for more curable cases, patients who had enjoyed the benefits of the hospital unrestricted were returned to their old filthy quarters where manacles and chains were resumed, a most emphatic illustration of the two methods under comparison.

In 1843, ten years after the opening of the Massachusetts State Hospital, Miss Dix memorialized the Legislature in a document of thirty-two printed pages, that the institution be enlarged. The fact that the barbarities to which the insane had long been subjected had been condemned by governors, commissioners and others, and that a hospital had for a decade been under the care of the most distinguish specialist in America, was not sufficent to prevent methods discreditable to any community. Miss Dix found patients in "cages, closets, cellars, stables and pens;" many were chained, naked, beaten with rods and lashed into obedience. She named forty towns, often with much detail, where such cruelties existed.

To one who has recently gone over the ground covered by that noble woman forty-seven years ago, her record is most suggestive, not an inconsiderable part of which can be duplicated. She spoke often of cages and shackles, but had more to say about the improper mingling of the sexes, untidiness, etc. There has been great improvement in our hospitals since the time spoken of, every one of which could properly adopt the motto, "Not how cheaply, but how well can I do my work," and the insane in almshouses are better cared for, yet the difference between the two forms of care is, I believe, as great now as it was fifty years ago. The state of the latter institutions is no new condition, and it will continue in some degree as long as the present methods obtain.

The memorial spoken of caused an investigation to be made by a legislative committee, which recorded its testimony against practices of which every unprejudiced individual is a foe.

At about the same time a committee, of which Dr. S. G. Howe was chairman, studied the condition and methods of the care of the insane, and in its report specified with minuteness cases of neglect, showed how the insane degenerate when placed in almshouses, and, after reviewing the whole field, recommended that the State take charge of them.

Again, in 1863, when one would suppose sufficient time had elapsed to remedy all these evils, another commission carefully studied the subject of insanity and the disposition of the insane. So comprehensive is that report that I should like to embody it in this paper; I will, however, make only a limited quotation: "Your Commissioners entered on their duties with the impression that the noble institution established by the State had removed all the principal causes of complaint. They knew that in former times men had been shut up in cages and treated almost like wild beasts, but they were unprepared to find instances

of such unnecessary cruelty in the State of Massachusetts at the present time." "The Overseers of the Poor can confine any pauper as a lunatic without the intervention of a judge and without the certificate of a physician, and when confined it is the duty of no one who is not interested in reducing the expenses of the town to visit the lunatic and see that he is properly cared for. The manner in which maniacs are confined in some of our towns requires immediate legislative interference."

Under the direction of the State Board of Lunacy and Charity, the writer has recently visited, or caused to be visited, all of the almshouses in this state where there are insane. In many the sexes are not properly separated, they are often untidy, and the patients are subjected to a great amount of unnecessary restraint. Some female patients are under the care of men, and in only a few instances do the insane receive care which approaches that bestowed upon a similar class at the State hospitals, the question usually being one of custody alone.

But in justice to Massachusetts I turn to other states, for evidence is universal that under the supervision of the Commonwealth the insane receive better care and in the end are more economically provided for (because more recoveries result) than is the case when placed under non-professional supervision.

After procuring the enlargement of the Worcester Hospital, Miss Dix got the Providence Hospital reconstructed, and then began the work of founding outright state asylums, starting with New Jersey and Pennsylvania and year by year carrying bills through the legislatures of twenty states. Did time permit it would be interesting, because the lesson is a vital one, to follow her steps and study the testimony of those who went after her; but only a few instances will be taken up in some of the representative states. They all point to the same conclusions.

New Hampshire has ten county asylums and almshouses, at which most of the town and county pauper insane are cared for. They are simply places of detention, and the treatment of the insane has been of a low order. They have recently come under the care of the new Lunacy Commission, which has removed a considerable number of patients to the State Asylum.

The Board of Public Charities of Pennsylvania said to its Legislature in 1873, regarding the insane in prisons and almshouses: "The shocking and sickening revelations so graphically set forth by Miss Dix in 1845 were not yet obsolete," and suggestively remarked "some improvement had been made in some of the places." Again, in 1885, the Committee on Lunacy of the Pennsylvania Board of Public Charities reported various cases of abuse and other improper treatment of insane found in various localities, and they characterized the county poor-houses as "seldom what they should be," "where proper requirements seemed onerous and exacting to the authorities, who are often the faithful representatives of a parsimonious public."

I am informed by an official of the State of Connecticut that throughout that Commonwealth there are many wretched almshouses where demented, harmless people are kept, some of whom "are greatly neglected and without medical care for their special ailment, and under no sort of systematic observation by a physician."

Michigan struggled long with this question, and "a year ago county care became a thing of the past. It continued during its entire existence to be a reproach to the county."

The new Lunacy Commissioners of New York have investigated the local asylums in that state. In their report, after reviewing the history of their asylums from the time that Gov. Throop, in 1830, called attention to "the privation and neglect to which the insane were subjected in the county poor-houses," the interesting story is related of how

the insane are likely to be circumstanced in such institutions. Without going into particulars as to the non-separation of the sexes, lack of proper medical care, the abuse, exposure and filth, it is enough to say that the recommendations have been adopted, and the insane now in county asylums are to be provided for in State hospitals.

A report comes through the daily papers from an almshouse in Maine, where an insane man escaped from his cage and carried out an often-repeated threat by setting fire to the detached building in which he and a bed-ridden woman lived, watching with pleasure the flames as they consumed his companion.

Fortunately we seldom see such an example of what non-medical management of the insane as a business may be, and to what it is likely to lead, as that exhibited at Longe Pointe, near Quebec. An asylum barely large enough for one thousand, is said to have been packed with seventeen hundred and thirty inmates, the basement and attic in constant use for patients, the latter place in July and August as hot as the infernal region. I am informed that the government of Quebec paid to the owners (of course not physicians) one hundred dollars a year for the care of each pauper patient. Since the contract with the government in 1873, they have made, so the papers report, nearly three quarters of a million at one hundred dollars per patient!! Can we wonder that there was want of fire protection, that there was wholesale restraint (to save bedding and clothing), confinement of patients in bare kennels in which were neither light nor air? Dr. D. Hack Tuke, the well-known alienist and author of London, inspected that place in 1884, and made a report of severe but just criticism. He characterized some portions of the buildings as chambers of horror, and said he should regard the Angel of Death as the most merciful visitant those wretched beings could possibly welcome. It is to be hoped, that if the asylum is rebuilt, the

contract system will be abandoned, the direction of affairs entrusted to a competent medical superintendent, and the whole placed under the supervision of a board of charity.

With our hospitals and asylums all overflowing, hundreds of insane in almshouses, many of whom are poorly cared for, and cases accumulating at the rate of about two hundred a year, the question for solution is one which interests general practitioners and specialists alike. Many of our almshouses, besides being put to their legitimate use (which is an honorable one), have, to use the language of another, "become receptacles to which may be assigned everything in the line of vice, crime and misfortune that has no other resting place:" they are patronized by people too lazy to work; the designing attempt, and often succeed, to make them refuges; some are workhouses, in name, most of the smaller ones lodge tramps, while at some truant schools are maintained.

With such a mixed population it is not to be expected (it is surely not the case) that the mentally sick can receive proper attention, where the amount of help is the lowest that can be endured, where the persons employed are usually inexperienced, seldom knowing anything about the care of the sick and not infrequently being unsettled and incompetent.

We do not hear it claimed that almshouse wardens can treat pneumonia, asthma or albuminuria, and I am unwilling to relinquish the belief that insanity of long standing is no less a disease, from which a goodly number will recover if unremittingly *treated*, and that its treatment should not be left to the ignorance of persons who may be well fitted for other vocations.

Most of the insane who are a public charge are so not because they are primarily paupers, but they become impoverished in consequence of the disease, and in losing the power to support themselves, their families often become

more or less dependent; hence it is not too much to maintain that this unfortunate class has a claim upon the Commonwealth out of all proportions to that of the ordinary pauper, who is often such by choice or vice.

With this fragmentary retrospect, in which not a tithe of the evidence at hand has been used, I trust I am warranted in presenting the following propositions:—

1. There has been great improvement in the care of the insane in this country, both in almshouses and hospitals since the establishment of the latter.

2. The same degree of difference between almshouse and hospital care has continued.

3. The best method to follow is that in which the State assumes the whole care and expense of the entire number of indigent insane.

DISCUSSION.

Dr. H. R. Stedman, of Boston:—This is a matter I have been interested in for a long time. I think a year ago last January, I read a paper on the subject of "The Care of the Insane," based on my observations of the almshouses in which there was a large number of the insane. I was surprised to find the state of neglect and abuse of these patients. Dr. Moulton, who was present, not only corroborated what I said but declared the condition to be a great deal worse. A number of houses were found where the sexes were allowed to intermingle, and where the premises were infested with vermin; where the heating was inadequate, the bedding poor, and the clothing of the patients scanty in the extreme. Several years ago departments of poor houses were established in different towns. It brought a large number of patients from the hospitals to be cared for by the towns, lowering the standard of care, but saving in the matter of expense to the towns. As a consequence there are now about eleven hundred patients cared for by

towns in this wretched way. The best remedy for this is, as Dr. Moulton says, that these patients should be under the care of the State, as has been lately adopted in New York. They can be taken from the almshouses, or boarded under the supervision of the State outside. It is somewhat of a satire on our charities that the State patients who are foreigners, largely from Ireland, can, on that account, be either kept in asylums and properly cared for, or they can be boarded under the supervision of the State, but they cannot be taken to almshouses where we native Americans are consigned. It is such an important subject that it is a pity that the paper could not be read before a larger number of physicians, as their influence shapes these matters in the different cities and towns. I think no better work can be done by physicians in various towns than to inquire for themselves just how many insane there are in the individual poor houses, and see what their condition is. I think they will be surprised at what they see.

Dr. Merrick Bemis, of Worcester:—I accept the literal truth of the proposition of Dr. Moulton. I am old enough to know something about the subject. I remember well the almshouses and hospitals of forty years ago. I know something of the condition of them in the State of Massachusetts ever since that time, and Dr. Moulton has not suggested anything which cannot be substantiated in every particular. I have rebelled all along, I may as well speak plainly, against transferring the insane people from hospitals to the almshouses. It has been setting Massachusetts back fifty years. I think the almshouses have made great improvement. Where the almshouses are improved, hospitals are also improved, and the difference in the care is as much to-day as fifty years ago. Now it seems to me the way to do is to place the whole care of the insane of the State of Massachusetts under the control of the State Board, which shall have the power to hold them in hospitals, or shall have authority to board them out in proper families, if proper families can be found. The towns should not, from motives of economy, take back girls and old feeble women and men, to suffer and die in almshouses which are incompetent to care for such cases. I know if Dr. Moulton were to tell the physicians what he knows, it would make a sensation.

DR. STEDMAN:—I made a sweeping statement. There are certain almshouses in Massachusetts which are admirably conducted, and they should not be lost sight of, particularly those of Salem and Provincetown.

DR. BEMIS:—I do not know but I have made the same assertion. I mean almshouses as a class throughout Massachusetts. We all know they are not places where we would like to have a member of our family go. The patients are not under proper care, nor under proper medical supervision.

DR. T. W. FISHER, of Boston:—I wish there was something favorable to report for the care of the insane during the coming year. I was at the State House recently at the invitation of the State Board of Lunacy and Charity, to present this subject before the Finance Committee. The question was the construction of new hospitals for the chronic insane. The treatment of the insane seems to be at a serious crisis. There are not only one thousand insane in almshouses, but there are seven hundred in the State Asylum, and necessarily there will be two thousand insane without adequate accommodations. These facts have been impressed on the Committee of Public Institutions during the last session, and they have reported in favor of a hospital for the chronic insane; but that bill has been referred at the last moment to the Finance Committee, and they seem to take an unfavorable view of any action at the present time. Next year will witness a serious overcrowding of the insane hospitals. I wish some action by this Society could be taken to reach the Committee on Finance before the close of the present session. As a matter of vital importance something should be done at once.

DR. WALTER CHANNING, of Brookline:—I can indorse all the gentlemen have said. The State of New York has gone through an experience similar to what we are having. Only during this last season, all insane have been put under the care of the State. The experiment was made of exempting some counties because the hospital was not sufficient to accommodate all the pauper insane in almshouses. I think at one time there were seventeen counties exempt which could retain the insane under the act, and the supervision

of these insane was put in the hands of the Board of State Charities in New York. But that has been from the start a failure. The powers of the Board have never been very wide, and for some reason or other they have never been able to carry out any great supervision. One of the arguments made by one of the authorities of the State Board of Charities was, that the proper supervision in almshouses of the insane was impossible, because the supervision demanded proper treatment and surroundings, and the authorities refused to take care of them and asked to have them sent to the State hospitals, the expense was so much more than before. It is impossible to carry out any supervision with the insane scattered through the State in a great number of almshouses,—another great argument against continuation of the present system of exemption. With regard to expense—we have heard a great deal of saving expense, and sending paupers back to the almshouses. At the almshouse $2.25 a week is expended for the care of each patient. If all the data could be got, the expenses would be larger than they appear. Taking the cost of small numbers, and comparing them with some of the State institutions, the expense is the same, and the most important objection of increased expense is refuted. It would be so in this State. I think if the Society could appreciate the necessity of taking some action, that that action should be taken now. The insane should be absolutely wards of the State, and cared for in no other way. Supervision can never be what it should be until this is done. The almshouses of Massachusetts are in a shocking condition, the same as fifty years ago.

ARTICLE VII.

MUSHROOMS
AND
MUSHROOM-POISONING.

By EDWARD J. FORSTER, M.D.,
OF CHARLESTOWN.

READ JUNE 11, 1890.

MUSHROOMS
AND
MUSHROOM-POISONING.

If any apology were needed for the paper which I offer this morning, I think it will be found in the following extract from a newspaper of last summer:

Toadstools mistaken for Mushrooms.—N * * *, N. Y., Aug. 13. A sad case of fatal poisoning by eating toadstools mistaken for mushrooms has occurred at N** C**, R*** County, the unfortunate victim being Miss M*** A. W**, a highly respected lady twenty-five years of age. On Thursday last the W** family ate dinner of what they supposed were mushrooms, gathered from the fields near by. Shortly afterward four members of the family were taken ill—two of the daughters, M** and A** being seriously affected. Yesterday, M** died at noon, and her sister is still very sick. An investigation revealed the fact that the supposed mushrooms were poisonous toadstools, closely resembling the former in appearance.

This is a fair sample of what I have found each year since I became interested in the study of mushrooms.

"Do you know a mushroom?" "Certainly, I have eaten them often." This answer generally refers to the canned ones, so often served with filet de bœuf, and which by the way resemble the fresh mushroom in flavor as much as hashed corned beef does a good porter house steak. "Oh, yes! a mushroom is a kind of toadstool." Such are the replies generally given to my question.

"But do you know a mushroom when you are walking in the fields, and are you sure enough of your knowledge, that you dare to take one home, cook and eat it without fear of being poisoned?" I think not.

It is the purpose of this paper to endeavor to impart that knowledge, and warn you against those whose character is doubtful and those which are known to be fatally poisonous.

I am quite sure that there are not many of the members who can with certainty distinguish the edible from the poisonous varieties. Some of you know the common meadow mushroom, but here your knowledge generally ends; you cannot distinguish with certainty the poisonous Amanita, the most deadly of all the fungi, one of the most common in our northern woods, as well as one of the handsomest.

If called to a case of mushroom poisoning, I am very much afraid you would treat it upon general principles, forgetting, if you ever knew, that general principles are here of little avail, and that reliance should be placed upon an antidote which is as effectual here as when properly given in other cases of poisoning.

To help you to a knowledge of the common varieties which are edible beyond peradventure, to recognize the deadly Amanita, so that you may give it a wide berth, to treat properly a case of poisoning if you should be so unfortunate as to be called to one, will be my endeavor this morning.

From the dictionaries we derive the following definitions:

Worcester says a mushroom is a "fungous plant of the genus Agaricus. Mushrooms inhabit meadows, rocks and masses of decaying vegetable matter, in many parts of the temperate regions of the earth. Among them a large proportion are poisonous, a few are wholesome, but by far the greater number are unknown in regard to their action upon the human constitution. The name is in popular use often restricted to the edible species." And he says that "a toadstool is a mushroom."

Webster says of Mushroom, "(Fr. mousseron, the white mushroom, from mousse, moss, or the same root bearing the sense of softness or nap). The common name of numerous plants of the natural order of Fungi. Some of them are

esculent, others poisonous. Mushrooms grow on dunghills, and in moist rich ground, and often spring up in a short time. The term mushroom is sometimes applied to distinguish the edible fungi from the toadstools which are poisonous." Toadstool he defines, "(toad and stool). A mushroom, a plant which commonly grows in moist and rich grounds."

Such are the definitions of the dictionaries, but I think each person makes the distinction between mushrooms and toadstools or defines the words according to his knowledge of the subject.

Thus to the cryptogamic botanist, "mushrooms" include all fungi which have a cap and stem and resemble the common edible mushroom of the market in their general appearance, and to such "toadstools" would be a synonymous word if they used it.

To the mycophagist who is not a botanist, all fungi that he knows to be edible are mushrooms; all others having the cap and stem, of the qualities of which he is ignorant or which he knows to be poisonous, are very likely to be called toadstools,—the commonly accepted idea being that known edible varieties are mushrooms, all others toadstools. So it is that education in mycology increases the number of mushrooms and decreases the number of toadstools. To paraphrase an old saw,

"One man's mushroom is another man's toadstool."

As this name "toadstool" is founded upon a popular error, no one ever having seen a toad using a fungus for a stool, is is better to forego the use of the word, particularly as association of ideas plays so great a part in our likes and dislikes; for as toads are to many persons noisome and uncanny creatures, the disuse of the word will perhaps allow many, who otherwise would not, to eat of some of the most delicious of nature's products, upon which they formerly

looked with suspicion if not with fear,—" Products of which " Mr. Julius A. Palmer truly says, "the harvest is spontaneous, it requires no seed-time and asks for no peasant's toil . . . . (a) feast, abundantly provided by nature for the poorest as well as the most epicurean."

I shall only use the term mushroom, prefixing it with edible or poisonous as the case may be.

That some mushrooms are poisonous and even fatally so, no one can deny, but the danger from eating them when ordinary care is exercised is greatly over-estimated.

Stevenson, who has written one of the best and latest works on British fungi, enumerates as growing in Great Britain 1218 species of mushrooms, that is, fleshy fungi having a stem and cap.

We probably have a larger number in this country, where the study of mycology is yet in its infancy, and only portions of our territory have been thoroughly investigated.

Of this great number it is safe to say that the majority are harmless; very many are too small or too quickly perishable to be of use as food; many are known to be edible and only a few poisonous, although quite a number will cause distressing and alarming symptoms.

Mr. Palmer, of Boston, to whom we owe the first and as yet the only series of colored plates of edible and poisonous varieties issued in this country, and who has practically and personally tested the edible qualities of mushrooms as much as any one about here, acts upon the belief that the fatally poisonous varieties will all be found belonging to a single and quite easily recognized species, namely the Amanitas. Many others have the same opinion, but have hardly the courage of their convictions, and back them by their practice.

Besides the mushroom proper there are many others of the fungi which are edible and easily recognized; namely the Puff Balls, the Clavarias and the Fistulina Hepatica.

There are still others, including the Morels, of which I shall not have time to speak.

The Puff-Balls (fig. 1) are very easily recognized, being round and when ripe emitting their spores in the form of dust. These are good when fresh, before the inside has changed from the purest white; they can be sliced, cooked in batter, and are then delicious. These are called the omelette mushroom, on account of the resemblance in taste to

FIG. 1.

that dish. When eaten in proper condition, none are poisonous, although with some a slight cathartic action is produced.

The Clavarias (fig. 2) are quite common in woods and are readily known; they resemble a piece of branching coral in miniature. Stewed or cooked with butter, they make a good addition to any joint.

The Fistulina Hepatica (fig. 3), also known as the beefsteak mushroom, can hardly be mistaken. It is red in color; in shape it looks like a tongue, and grows on oak

and chestnut trees. It is not common. Prof. Farlow tells me that he found several last year, and doubted if I should know the difference from a beefsteak if I had eaten them after they had been cooked. I never found them until last season, and then they were too small for me to test their edible qualities.

FIG. 2.

A mushroom we will understand to be a fungus that has a stem and cap, *i. e.* umbrella-like in shape, and is not woody in texture.

Before proceeding farther in this necessarily somewhat cursory glance at our subject, it is best that we learn the meaning of a few botanical terms.

The cap or pileus is the expanded top, and rests upon the stem. The under side of this cap bears either gills, tubes or teeth. The gills are thin plates radiating from the centre, where the stem is joined to the cap. The tubes or pores are small holes, and give the under side a spongy appearance. The teeth are spines or bristles of different lengths. All these, gills, tubes and teeth, are covered by a thin membrane, which again is covered with the spores, which are the reproductive bodies and appear like fine dust when deposited upon anything lying under the cap. It has been

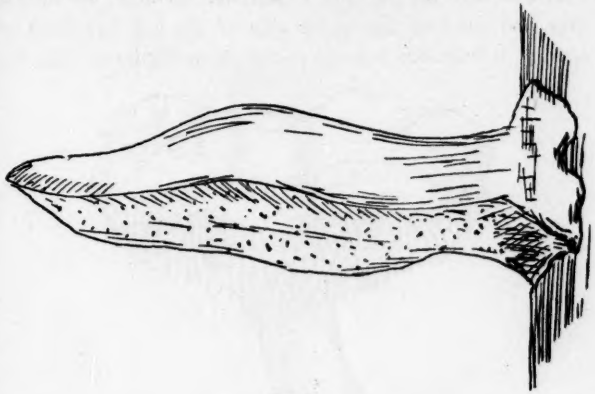
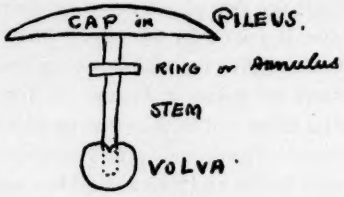


FIG. 3.

estimated that the number of spores in a single plant may exceed 10,000,000. Before the cap of the mushroom is fully expanded, the under side is covered by a membrane known as the veil; a portion of this is sometimes left upon the stem, and it then forms the annulus or ring; often this is movable. With some varieties the entire plant, before issuing from the ground, is enclosed in a membrane, portions of which remaining upon the cap, form warts, and a part remains about the base of the stem, forming a sheath or volva. This is very important, as the presence of these

warts and the volva is a guide to distinguish the deadly poisonous varieties.



Let us take up the first mushroom we find; we turn it over and see that the under side of the cap has teeth or spines; it therefore belongs to the genus Hydnum (fig. 4).

FIG. 4.

There are no poisonous species, but on account of the toughness and woody character of many, Dr. Badham says, "to eat must depend upon the united consent of the stomach and the teeth." The esculent variety is the Hydnum repandum, orange in color, two to five inches across, flesh white,

turning yellow when cut, spines pale yellow. There is no fungus with which this one is likely to be confounded; once seen, it is always remembered and may be gathered fearlessly.

We next find a mushroom with a spongy look underneath; this appearance is due to myriads of fine tubes; this satisfies us it is a Boletus (fig. 5), a family which contains

FIG. 5.

no members which are fatally poisonous. Vittadini says this "is not strictly the case, though many species hitherto reputed unwholesome, or worse, appear to lose their bad qualities by drying." Those having high-colored or red tubes have been considered poisonous, but no fatality is recorded. The mild-colored ones, with white, yellow or green tubes, if pleasant to the taste, are safe to eat, and sliced and fried in batter make a fair addition to our table.

This time our mushroom has neither teeth nor spines nor tubes, but has the radiating gills (fig. 6); we are approaching dangerous ground, for among these are many whose poison is fatal.

There is no rule by which the good can be distinguished from the bad; this should be strongly impressed on the mind. That the skin of the cap peels readily, that they change color when cut or are bruised, that they do not tarnish gold or silver with which they are boiled, that the stem comes readily out of the cap or grows at one side, and a dozen other reasons, are all equally fallacious; there is no such rule which has not its exception, and here an exception may mean death. Safety lies in knowledge,—positive knowledge. You should know positively the variety or varieties you venture to eat, and eschew all others.

FIG. 6.

You should fix firmly in your mind the characteristics of those you venture to eat, so firmly that you can pick them from a basketful of all kinds. You know the difference between a squash and a pumpkin, and would make no mistake in taking one for the other; but it might puzzle you to describe the salient points so that your cook, who had seen neither, would choose by your direction from the kitchen garden the proper vegetable for an old-fashioned pumpkin pie, and not bring a squash or possibly a bitter gourd. So

it is with a mushroom,—you must know it, and know it positively; when once learned there should be no more chance for a mistake than you would have in picking out a pumpkin.

The gill-bearing mushrooms belong to the family known as the Agaracini or Agarics; this is again divided into thirty or more genera, a division which concerns the botanist but to us is of no value. A division which is of practical use to us is one made by noticing the color of the spores; this can be seen by an examination of the gills with a lens, or better by removing the stem, placing the cap, gill downwards, on a piece of glass, and letting it remain over night, although in some cases an hour or so will answer. The spores will be found deposited on the glass, and will show the radiation of the gills. When several mushrooms grow together and overlap one another, the spores are often found on the caps of the under ones.

Classifying the Agarics by the color of the spores, we have the following divisions:—

I. Leucospori, or white spored agarics.
II. Hyporhodii, or pink " "
III. Dermini, or brown " "
IV. Pratellæ, or purple " "
V. Coprinarii, or black " "

Among the leucospori, besides many others of which I shall not speak, will be found the following genera: Agaricus, Lactarius, Russula, Cantharellus and Marasmius, which contain both edible and poisonous species. The larger forms of these genera are rather easy of identification. Agaricus has three sub-genera which particularly demand our attention, namely Amanita, Lepiota and Pleurotus.

The Amanitæ are distinguished from all others in having warts upon the upper surface of the cap, a volva and usually a ring. While some varieties are edible and much sought for, others are highly poisonous. These are the handsomest

of our mushrooms, and are oftenest eaten by careless gatherers.

Notwithstanding the good character some varieties are given, a wise caution should prevent any but the experienced mycologist from essaying their edible qualities.

The Lepiota have one variety which can be mistaken for nothing else, the Lepiota procerus or Parasol Mushroom. It is found in lawns and open fields, grows to an enormous size, has a long stem and is easily recognized by the brownish scaly top, the ring which is movable, and the absence of a volva. The scaly top differs from the warty top of the amanita; the warts can easily be removed, not so the scales which are simply the cap itself ruffed up. Pleurotus has one variety easily recognized; it is found only growing upon the elm tree and is edible, but to my taste of poor flavor.

Lactarius is a genus known by the milky juice which exudes from the gills and from the cap and stem when broken. Lactarius deliciosus, or the Orange Milk Mushroom, is a highly esteemed variety. Badham says "there is but one fungus which it any way resembles, and as that one, L. torminosus, is acrid and poisonous, the gatherer must pay attention to the following characteristic difference between the two, namely that the milk of the Lactarius deliciosus is *red and subsequently turns green*, while that of L. torminosus is *white* and *unchangeable*."

The Russulæ resemble very much the Lactarii except that they have no milky juice; they are easily remembered when once pointed out, by their extreme brittleness, stout spongy stem and dry texture. They have some of the best edible, and also some poisonous varieties.

If you are sure you have a Russula it may be eaten, if on trial of each specimen a piece of the stem is not acrid or unpleasant to the taste; this rule holds good for the Lactarii. These two genera are destitute of a ring. Can-

tharellus is a very easily known genus, the stem being confluent with the cap, the gills thick and swollen, resembling more the veins of a leaf than the usual gills. Cantharellus cibarius or the "Chanterelle" is a bright yellow throughout and has the odor of apricots; it is held in high esteem by fungus eaters.

While all the foregoing white spored mushrooms are fleshy and soon become putrescent, Marasmius differs from them all in that they wither in drought and revive when wet; they can be dried, and will keep for years, retaining all their good qualities, and when moistened they swell to their original size and are then ready for cooking. We have a very common variety which is esculent and easily recognized, viz. the Marasmius Oreades or Fairy Ring Champignon, also called the Scotch Bonnet. Its little buff head is seen on every lawn. It grows in segments of a circle, giving it its name of Fairy Ring. When once seen and carefully studied it should be mistaken for nothing else, although it is sometimes accompanied by those of about the same size, whose only resemblance is the buff color of the cap.

We have now glanced rather hastily at the white spored mushrooms. But while many are most excellent, many are so poisonous that my advice to the novice is to wait until he becomes a student of mycology, before eating any except the Parasol, the little Scotch Bonnet and the Elm Tree Mushroom, and then the chance of any mistake will be reduced to a minimum. I am confident that all fatal cases of poisoning have been caused by eating those with white gills and spores; this I think is shown by the tables of cases which I have collected. Among the pink and brown spored agarics, are some which are edible, but their qualities had best be tested only by the professed mycophagist. The purple spored agarics give us the two varieties which are so well known throughout the world and so highly esteemed for their edible qualities, namely the Agaricus campestris or Meadow

Mushroom and the Agaricus arvensis or Horse Mushroom. These so closely resemble one another that they are sold indiscriminately, and for the purpose we have in view they may be treated as one and the same. They are found in meadows, never in woods, their gills are of the most delicate flesh pink when they first appear above the ground, changing soon to a darker shade, finally becoming a dark purple almost black. The cap is dry, silky or downy, globular, with the margin united to the stem by the veil which soon becomes a ring about the stem, when the cap expands, the latter being bell-shaped at first and then almost flat. The stem is nearly solid, separates easily from the cap, and there is no volva.

It must be remembered that the volva is only found in the Amanita of the white spored and the Volvaria of the pink spored varieties, which latter we have not considered. The Pink Gill is the only species which is successfully propagated by man; vast quantities are raised in the caves about Paris; the young ones, *i.e.* with cap unexpanded, are the button mushrooms of commerce. Many are raised by the market gardeners about Boston.

It is believed by many that the Pink Gill is never found, except where cattle have been pastured, or the grass fertilized by their manure, the passage of the spores through their alimentary canal being in some way necessary for fertilization.

The Horse Mushroom sometimes grows to an enormous size; a specimen has been reported weighing fourteen pounds. These two, Pink Gill and the Horse Mushroom, are the only ones of the purple spored which had better be essayed, as other varieties are reported as causing symptoms affecting the nervous system. Of the black spored only those whose gills deliquesce into an inky fluid are considered as edible: of these there are several varieties; to one only shall I call your attention; it is so common and its charac-

teristics so well known that a mistake seems incredible. I refer to the Coprinus comatus, or Shaggy Mane Mushroom, known also as the Agaric of civilization, as it is found on dumps, dust heaps and about lawns on newly filled land. The cap or pileus is first oval and hard, the margin soon separates from the stem, leaving a ring, the margin quickly turns to a bluish black, and after expanding the whole plant dissolves into an inky fluid. The color is white to a brownish tint, the cap wooly or shaggy caused by the skin peeling and curling up in small sections; the stem is hollow. This used to grow, and perhaps does now, in profusion in the grounds of the Massachusetts General Hospital. I have found it in various parts of the city. It is used in all stages to make ketchup, but to stew or broil it should be taken before it begins to turn black.

The only mushrooms of the agaric family which I think you are safe in trying, are the Parasol, Elm Tree and Fairy Ring of the white spored; the Pink Gill of the purple spored; the Shaggy Mane of the black spored. But first be sure of your knowledge.

These five varieties of agarics, with the mild colored Boleti, the spiny Hydnum, the Puff Balls and the Clavarias, will give you sufficient variety of fungoid esculents, until such time as you become a student of mycology and a professed mycophagist.

Let us recapitulate by looking at the figures and the following tables:—

TABLE No. 1.

Not Umbrella Form.	Puff Balls.	Edible.
	Clavarias.	
	Fistulina.	
Umbrella Form.	Spines or Teeth=Hydnei.	
	Tubes or Pores=Boleti.	
	Gills=Agaricini.	

TABLE No. 2.

AGARICINI.
- LEUCOSPORI, or WHITE SPORED AGARICS.—SEE TABLE No. 3.
- HYPORHODII, or PINK " " — NOT CONSIDERED.
- DERMINI, or BROWN " " — NOT CONSIDERED.
- PRATELLÆ, or PURPLE " " — THE "PINK GILL."
- COPRINARII, or BLACK " " — THE "SHAGGY MANE."

TABLE No. 3.

WHITE SPORES.
- AGARICUS.
  - AMANITA—DEADLY POISON.
  - LEPIOTA—THE "PARASOL."
  - PLEURotus—THE "ELM TREE."
- LACTARIUS. } EATEN ON TASTE.
- RUSSULA }
- CANTHARELLUS.—THE "CHANTARELLE."
- MARASMIUS.—THE "FAIRY RING."

TABLE No. 4 [EDIBLE].

WITHOUT GILLS.
- PUFF BALLS.
- CLAVARIAS.
- FISTULINA.
- BOLETI.
- HYDNUM REPANDUM.

WITH GILLS.
- THE "PARASOL," [LEPIOTA PROCERUS.] — WHITE SPORES.
- THE "ELM TREE," [PLEURotus ULMARIUS]. — WHITE SPORES.
- THE "FAIRY RING," [MARASMIUS OREADES]. — WHITE SPORES.
- THE "PINK GILL," [AGARICUS CAMPESTRIS].—PURPLE SPORES.
- THE "SHAGGY MANE," [COPRINUS COMATUS].—BLACK SPORES.

TABLE No. 5.

THE DEADLY POISONOUS AMANITA HAS
- WHITE GILLS.
- WHITE SPORES.
- WARTS ON CAP.
- A RING.
- A VOLVA.

The poisons of mushrooms may be as varied as the species from which they are derived, but the symptoms arising

therefrom can be classified under two heads: (*a*) those which occur soon after ingestion, within an hour or so, and (*b*) those whose appearance is retarded for eight to twelve hours. The early symptoms are those of an irritant to the alimentary canal, as vomiting, purging and the consequent exhaustion; and unless the quantity taken was excessive, or the taker debilitated, the after effects would not be serious, or at least not fatal: not so, however, if the symptoms come on later; here we have the effects of an irritant narcotic, purging and vomiting are followed by giddiness, vertigo, precordial distress, labored respiration, contracted pupils, coma and death,—the latter having occurred as early as thirty-six hours after the fatal repast. Most authorities agree that these more serious symptoms are only caused by the Amanitas, which you will remember as among those having white gills and spores. Some go so far as to state that it is only from these that fatal results have occurred.

To satisfy myself about this, I examined the literature of the subject, as found in the medical journals of this country, and have tabulated all the cases I could find recorded.

For ten years Mr. Palmer gave much time and study to mycophagy, and the results of his investigations he kindly placed at my disposal. He collected thirty-three cases, twenty-one of which were fatal. From other sources,—American medical journals, brother practitioners and the daily press,—I have forty-four cases, of which fourteen were fatal.

The tables are very unsatisfactory from their incompleteness, but are of value as bringing together, besides those collected by Mr. Palmer and the writer, all the cases occurring in this country which have been reported in the medical journals as noticed in the Index Medicus. Very many essential details are entirely omitted. By thus grouping the cases, the attention of practitioners will be called to these omissions, and future reports will perhaps be more carefully

made. The headings used are believed to cover all important points. They are:—

1. Number of case.
2. Name.
3. Date.
4. How cooked.
5. Description of plant.
6. Hour when eaten.
7. Taste.
8. Quantity eaten.
9. Symptoms began.
10. Description of first symptoms.
11. Description of later symptoms.
12. Treatment.
13. Result.
14. Length of illness.
15. Physician in attendance.

The writer will gratefully acknowledge reports of cases or references to the subject.

I will not detain you by reading the dry details of the tables I have prepared, but simply state that from my examination of the cases collected I am confident that the fatal ones were due to eating such as had white gills, or had other characteristics of or were known to be Amanitas. As the cases are mostly reported by those not versed in fungology, the descriptions are necessarily defective, but the mere statement that the under side of the mushroom was white leads me to infer that the fatal result was due to an Amanita, writers so generally agreeing that death is not caused by other varieties.

From a study of the cases where the symptoms developed after eight or twelve hours, and more than a very small amount of the fungus had been taken, the treatment by the usual methods of giving emetics, cathartics, astringents or stimulants, combined or alone, has I find been universally unsuccessful; but when the chief reliance has been placed upon atropia the results have been most brilliant. It is true

TABLE I. CASES COLLECTED BY JULIUS A. PALMER, JR.

No. of Case.	Name.	Date.	How Cooked.	Description.	Hour Eaten.	Taste.	Quantity.	Symptoms began.	First Symptoms.	Later Symptoms.	Treatment.	Result.	Time.	Physician in Attendance.
1	Miss Emma Baker,	Monday, 2 Oct. 1876.	Fried in batter.	White, with gills.	Dinner, 3-4 P.M.		Three small pieces of stem.	12 P.M. 8 hours.	Vomiting.			Fatal.	Thursday, 10 A. M.	Dr. M. C. Tobs. Dr. Edw. T. Whittingham.
2	Miss Louisa Crane,	" "	" "	" " "	" "		One-half of one.	10(?) hours.	Pain in Stomach.	Pupils contracted, precordial distress.	Battery.	Fatal.		
3	George Melville, 16 yrs.	" "	" "	" " "	" "		One-half of one.	8 hours.	Vomiting, Purging.	Pupils contracted, resp. labored.	Ether, morph. etc. Small quan. bella. Battery.	Fatal.		
4	Miss Pool,	" "	" "	" " "	" "	"Earthy."	Small piece of stem.	Tuesday.	Diarrhœa for two days.	Nervous prostration for 2 weeks.		Recovery.		
5	Mrs. Mix ("old lady"),	Sept. 1877.		Case reported by P. Casamayer. A. Vennes(?). "Ginger-bread top Boletus." "Light pink gills,"				about 12 hours.	Vomiting and bilious diarrhœa.		Opium. Bismuth. Ammonia. Oil. Rest and bath.	Recovery.		I. W. Lee, M.D.
6	George Palmer,	1878.		Boletus felleus(?). J. A. P.				½ hour.	Fear of losing consciousness.	Sinking sensation in stomach and great weakness.		Recovery.	1½ hrs. all over.	
7	Valentine Kane,	22 Aug. 1877.	Stewed.	Picked in meadow.	Breakfast.			12 hours.	Voting.	Delirious.		Recovery.		
8	Valentine " (son), 5½ yrs.	" "	"		"			12 hours.				Fatal.	About 36 hours.	Dr. Tait, Meriden, Conn.
9	Henrietta " (dau.), 4 yrs.	" "	"		"			12 hours.				Fatal.	About 38 hours.	
10	William A. Wilson,	Tuesday, {16 Sept. 1878. {17 Sept. 1878.	{Raw. {Stw'd in milk.	"White gilled, yellow topped."	Supper & Breakfast.			17 and 30 hours.	Colic a purging.	Headache.	Whiskey and oil.	Recovery.		
11	(boy) " 8 yrs.	" "	"	" "	" "		Dozen tastes Sunday night and Monday morning.	24 hours.	Diluea.	None.	None.	Recovery.		Reported in Bost. Med. & Surg. Jour. by J. A. P., Jr., 28 Aug. 1879.
12	(girl) " 11 yrs.	" "	"	" "	" "			4(?) hours.	Headached Diarrhœa.	None.	None.	Recovery.		
13	(girl) " 13 yrs.	" "	"	" "	" "			3 hours.			None.	Recovery.		
14	Mrs. W. A. Wilson,	" "	"	" "	" "		Drank also pint of the stew liquid.	1 hour.	Diaœa.	Headache.	None.	Recovery.		
15	Frederick Sussig, 30 yrs.	Sept. 1879.		"Said to be all white."	Supper(?).		"Did not eat heartily."	14 hours.			Chloroform, bromide, chloral, electricity, belladonna.	Recovery.		Dr. R. M. Kirk, Linden, N. J.
16	Mrs. Matilda Sussig,	" "		"	"		"Soup plate full."					Recovery.		
17	Lizzie Sussig, 7 yrs.	" "		"	"		"About one dozen."					Recovery.		
18	Annie " 6 yrs.	" "		"	"		" " "					Recovery.		
19	Lena " 4 yrs.	" "		"	"		" " "					Fatal.	43 hours.	
20	Fred. Wm. Sussig, 14 yrs.	" "		"	"		" " "					Fatal.	46 hours.	
21	Col. John Cremony and others,	1875.		Unknown. 5-6 inches across. "Unusual quality."	Late(?) Dinner.			6 hours.	Vomiting, png, cramps.	Confined to room for several weeks.	Milk and eggs.	Recovery.		
22	N. K. Raynes,	15 Sept.	Fried.		11 A.M.		Heartily.		Dizzind. Voig.	Unconscious, extrem. cold, p. 90.	Emetic, ammonia, castor oil, whiskey, turp...	Recovery.		Dr. N. L. Folsom, Portsmouth, N. H.
23	Miss E. Raynes,						Ate few.		Vong.			Recovery.		
24	Mrs. Raynes,											Recovery.		
25	Geo. J. Chipman, 24 yrs.	17 Sept. 1879.		"Toadstools,"								Fatal.		
26	John K. Fairman,	August, 1885.		"Of different sizes."			Ate bountifully.	12 hours.	Diarrhœmiting.	Pain in heart. Heat in stomach.		Fatal.		R. M. Barrows, Woodlawn Park, Ills.
27	Mrs. "						Ate three or four.	12 hours.	Diarrhœmiting.			Recovery.		
28	Mr. Ferris,	Sunday, 30 Aug. 1885.	Stewed in milk.	"White." In woods.	8 P.M.	Acid.	"Ate one."	about 10 hours.	Crampaiting.		Emetic and stim. Atropia 1-60 to 1-180.	Recovery.		J. E. Shadle.
29	Mrs. "			"			Three plates full.	12 hours.	Breath heavyps, oppression in trium.	Resp. slow. Stupor.	" " " " " " "	Fatal.	63 hours.	Med. and Surg. Reporter, Phil., 19 Dec. 1885.
30	Thomas R. ——, 13 yrs.			"			Three plates full.		Crampaiting.	Resp. slow. Stupor.	" " " " " " "	Fatal.	57 hours.	
31	Mrs. R.			"			"Ate one."	12 hours.	Cramps in epigm, vomiting.		" " " " " " "	Recovery.		
32	Mrs. B.			"			"One teaspoonful."		Crampaiting.		" " " " " " "	Recovery.		

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TABLE II. CASES COLLECTED BY EDWARD J. FORSTER, M.D.

No.	Name.	Date.	How Prepared.	Description.	Hour Eaten.	Taste.	Quantity.	Symptoms began.	First Symptoms.	Later Symptoms.	Treatment.	Result.	Time.	Physician, Journal, Etc.
1	John Watters. (Adult.)	4 Sept. 1879.	Not stated.	"Eaten mushrooms."	Not given.	Not stated.	Not stated.	Not stated.	Not given.	Stupor, suppression of urine.		Recovery.	Not given.	
2	(daughter. 12 yrs.)	" "	" "	" "	" "	"	"	"	"	" "		Recovery.	"	
3	(child.)	" "	" "	" "	" "	"	"	"	"	Convulsions.	Tr. bella., friction, tr. digitalis, demulcents. Quantity not stated.	Fatal.	"	
4	(child.)	" "	" "	" "	" "	"	"	"	"	"		Fatal.	"	Dr. W. P. McGlenn, Henryville, Ind. Louisville Med. Herald, Oct. 1879.
5	(baby.)	" "	" "	" "	" "	"	"	"	"	Not stated.		Fatal.	"	
6	(not stated.)	" "	" "	" "	" "	"	"	"	"	" "		Not sta'd.	"	
7	Mr. C.	21 Sept. 1879.	Raw.	None.	Forenoon.	"	"	"	Diarrhœa.	Vomiting, irregular pulse, felt stupid and alarmed.	Chloroform and ammonia carb.	Recovery.	"	
8	Mrs. C.	" "	Cooked.	"White under the cap."	Noon.	"	Not more than four small ones.	4 A.M., 22 Sept.	"	Vomiting, pulse irregular and intermittent, anxiety, hiccough.	Castor oil, chloroform, morphia.	Recovery.	"	
9	(man.)	" "	Not stated.	" " " "	Not given.	"	Not stated.	Not given.	None given.	None given.	None given.	Recovery.	"	
10	(man.)	" "	" "	" " " "	Presumably at noon.	"	"	"	"	"	"	Recovery.	"	
11	(man.)	" "	" "	" " " "	Not given.	"	"	"	"	"	"	Fatal.	"	Dr. A. C. Shuman, Louisville, Ky. Louisville Med. News, Oct. 1879.
12	(boy.)	" "	" "	" " " "	" "	"	"	"	"	"	"	Fatal.	"	
13	(not stated.)	" "	" "	" " " "	" "	"	"	"	"	"	"	Recovery.	"	
14	(not stated.)	" "	" "	" " " "	" "	"	"	"	"	"	"	Recovery.	"	
15	Mr. H.	31 Aug. 1879.	Fried or boiled.	Bright and clear white "peeling the cap."	Supper.	"	"Liberally."	Next morning.	Vomiting, diarrhœa.	Stupor, nausea, vomiting, thirst, headache, tenesmus and purging.	Opium, enemas.	Recovery.		Adolph Kessler, New York.
16	Mr. C.	" "	" " "	" " " " " " "	"	"	"Good many."	"That night."	Violent pain and nausea.	Collapse, thirst, pulse weak; respiration shallow, short, oppressed	Opium, camphor, ether, musk, atropia 1-50 gr. doses for 3 days.	Fatal.	18 days.	Am. Jour. Med. Sc., Oct. 1880. Cases fully reported.
17	(young lady.)	Not given.	Raw.	None.	Not given.	"	Not stated.	Four hours.	Dizzy, constriction, vertigo, staggering, dryness of fauces, rapid and full pulse, elevated temperature.	Two hours later, wild and apprehensive delirium.	Emetics, cathartics, ether internally.	Recovery.	Not given.	Horace Y. Evans, Philadelphia.
18	" "	" "	"	"	"	"	"	" "		" " "	Ether internally.	Recovery.	"	Phila. Med. News, 10 Feb. 1883.
19	G. E. Everett (father, 44 yrs.).	23 Sept. 1882.	Cooked.	"From woods." "No doubt Amanita."	Noon, dinner and supper.	Earthy and uninviting.	"	Midnight.	Vomiting, purging and cramps.	Vomiting and purging, prostration, hiccough.	Not stated.	Fatal.	13 days.	
20	(mother.)	" "	"	" "	" "	"	Teaspoonful of liquid.	"	" " " "	Tenderness in epigastrium, acid eructations.	Bismuth and soda.	Recovery.	3 days.	
21	(grandmother.)	" "	"	" "	" "	"	Not stated.	"	" " " "	Oppressed breathing.	Alcohol.	Fatal.	2 days.	
22	(son, 13 yrs.)	" "	"	" "	" "	"	Two fungi.	Bedtime.	Malaise, vomiting, purging and cramps.	Not given.	Not stated.	Recovery.	3 days.	
23	(daughter, 15 yrs.)	" "	"	" "	" "	"	Not stated.	Not stated.	" " " "	"	"	Recovery.	3 days.	
24	Mr. Thorne.	16 Sept. 1882.	"	White Gills.	Noon.	Not stated.	"	Midnight.	Vomiting, purging and cramps in legs.	Collapse, purging, thirst, pulse small and frequent.	Ipecac, stimulants, heat.	Fatal.	2 days.	
25	Mrs. Thorne.	" "	"	" "	"	"	"	"	" " " " "	Lassitude and nervous prostration.	Not given.	Recovery.	Protracted convalescence.	Dr. I. D. Trask, Astoria, N. Y. Am. Jour. Med. Sc., April, 1883.
26	(peddler.)	" "	"	" "	"	"	"	Not stated.	"Very ill."	Not stated.	"	Recovery.	Not given.	
27	Mr. Z.	20 Sept. 1882.	Soup.	"Mushrooms," and filled a small milk pan.	5 P. M.	"	"	4 A.M.	Nausea, vomiting, pain, purging.	" "		Recovery.	"	
28	Mrs. Z.	" "	"	" " "	"	"	"	3 A.M.	" " " "	Nervous prostration and restlessness.		Recovery.	4 weeks.	
29	Charles Upright (16 yrs.)	" "	"	" " "	"	"	"	6 A.M.	" " " "	Somnolence, stupor, bloody dejections, intermittent pulse.	Spirits ether, brandy, opium and olive oil, dessert-spoonful every 2 or 3 hours.	Fatal.	5 days.	
30	Mary	" "	"	" " "	"	"	"	5 A.M.	" " " "	Great tenesmus, bloody dejections.		Recovery.	Not given.	
31	William Baker (17 yrs.).	" "	"	" " "	"	"	"Large amount."	Next day at noon.	" " " "	Bloody dejections.		Fatal.	4 days.	
32	(Scotchman, 72 yrs.)	24 Oct. 1874.	Cooked.	"Supposed mushrooms, under a tree."	Breakfast.	Bitter.	One or two.	After breakfast.	Vomiting and diarrhœa.	Exhaustion.	Not given.	Fatal.	3 days.	
33	(daughter.)	" "	"	" " "	"	"	One.	Evening.	Vomiting.	Vomiting.	"	Recovery.	3 days.	
34	(boy, 13 yrs.).	June, 1884.	Raw.	Gills white, top flattened cone.	Three hours after dinner.	Not stated.	Considerable.	Within hour.	Vomiting, pain in abdomen, giddiness, staggering.	Active delirium for an hour or two.	Apomorphin.	Recovery.	Not given.	Dr. A. H. Hodgdon, Dedham, Mass. Letter.
35	(boy, 11 yrs.)	" "	"		" "	"	"	"		Coma, dilatation of pupils, muscular twitching.	Apomorphia, stomach-pump and whiskey.	Recovery.	"	
36	Paul Ives (9 yrs.).	1886.	"	White with slender stems.	1 P.M. on empty stomach.	"	Two large ones.	"	"Light headed," delirious; vomited.	"No pulse." "Pallor." " "	Coffee and brandy.	Recovery.	"	Mrs. C. P. Ives, Meriden, Conn. Letter.
37	John Grady.	Sept. 1888.	Cooked.	None.	Evening dinner.	"	"Some."	Several hours.	Vomiting.	Agonizing pains. "Almost unconscious."	"Antidotes."	Recovery.	"	
38	Mrs. Grady.	" "	"	"	" "	"	Considerable.	"	"	" "	"	Fatal.	28 hours.	New York Herald, Tuesday, 30 Sept. 1888.
39	Mrs. Siegler.	" "	"	"	" "	"	Few mouthfuls.	"	"	" "	"	Recovery.	Not given.	
40	Mrs. Fuller.	" "	"	"	" "	"	" "	"	"	" "	"	Recovery.	"	
41	Matilda Wylde.	August, 1889.	Not stated.	Supposed mushroom from fields.	Not stated.	"	Not stated.	Not stated.	Not stated.	Not stated.	Not stated.	Fatal.	"	
42	Anne "	" "	" "	" " " "	" "	"	"	"	"	"	"	Recovery.	"	Boston Transcript, 13 Aug. 1889.
43	—— "	" "	" "	" " " "	" "	"	"	"	"	"	"	Recovery.	"	
44	—— "	" "	" "	" " " "	" "	"	"	"	"	"	"	Recovery.	"	

that I have the records of fatal cases where this drug had been given, but in such small doses (1–180 to 1–60 grain), that I was not surprised at the result.

The symptoms indicate a poison whose action is like that of morphia, and if it is to be combated successfully, the same treatment as used for an overdose of that drug must be given, namely atropia in full doses, one-third of a grain at a time for instance. One grain of atropia has been given in opium poisoning with success. I have treated at the Boston City Hospital and reported a case of poisoning by morphia, where I gave three-fourths of a grain of atropia, —one-half grain at once and one-quarter grain in ten minutes,—and saved the patient. Wharton and Stillé state that while one-sixth grain of atropia has caused alarming symptoms, death has not been caused by a grain; therefore I think that when we have present as powerful a poison as that found in the mushroom we had best use the antidote in moderately large doses.

The treatment by atropia is based upon the perfect antagonism which exists between this drug and the poison of the amanitas, which has been separated by Prof. Schmiedelberg and named muscarin. The poison has been separated by others and variously named, according to the variety from which it was obtained. The merest trace of this alkaloid will arrest the pulsation of a frog's heart, and even after four hours Lauder Brunton states he has caused it to pulsate again by a minute quantity of atropia being brought in contact with the organ. This and other experiments showing the antagonism between these two poisons, have been repeated by Prof. H. P. Bowditch at the Harvard Medical School. It acts as well upon mammals as upon frogs. My friend Dr. F. H. Williams, Assistant Professor of Therapeutics, tells me that he has recently brought the subject of mushroom poisoning and its proper treatment to the attention of his students in the Harvard Medical School.

XUM

In the treatment of such cases, general principles should only guide us to remove any of the poison remaining in the alimentary canal, by emetics and purgatives, to support the failing powers by proper stimulation. But the treatment should not stop here; our reliance must be upon an antidote; the poison already absorbed must be counteracted, an antidote must be used; and that antidote, I repeat, is atropia.

The course of treatment which has usually been followed in severe cases of mushroom poisoning has been as efficacious and successful, and based upon as scientific principles, as the answer to the statement said to have been made by a southern professor, who lecturing upon tannic acid, remarked: "And by the by, gentlemen, tannic acid is the antidote to the poison of the mushroom; can any of you explain its action?"

"T–t–th–think I can, professor."

"Well, sir, explain to the class the chemical re-actions that occur, and how tannin acts as an antidote to the poison of the poisonous mushroom."

"It f–f–forms the t–t–tannate of mush, and leaves room in the stomach!"

ARTICLE VIII.

TWO CASES OF LAPAROTOMY FOR TUBERCULAR PERITONITIS.

By LEONARD WHEELER, M.D.,
OF WORCESTER.

READ JUNE 10, 1890.

XUM

TWO CASES OF LAPAROTOMY FOR TUBERCULAR PERITONITIS.

CASE I.—C. K. was seen first in consultation with Drs. Homer Gage of Worcester, and Gifford of Leicester. We agreed in the diagnosis of Tubercular Peritonitis, and advised admission to the City Hospital for laparotomy.

August 6th, 1889, he was admitted to the service of Dr. Rich, by whose kind consent I include this case with my own. He was 17 years old, single, operative. Family history negative. Habits alcoholic. Had always been perfectly well up to three weeks before entrance, when he was seized with pain in the bowels, which gradually grew worse. He kept about his work for several days, and was then obliged to go to bed. Abdomen had increased in size until at time of entrance it was very full and tense. Appetite was gone; there had been some vomiting. Bowels inclined to constipation. The abdomen was everywhere tympanitic, there was no ascitic wave, it was but slightly tender, there were no hard masses. Temp. 100; pulse 100; urine and chest examination negative.

Aug. 8th. Etherized; laparotomy by Dr. Rich; median incision below umbilicus, 4 in. in length. Upon opening the peritoneum, clear straw-colored ascitic fluid escaped to the amount of a few pints. The peritoneum was studded with small nodules. Light adhesions were general. These were not extensively disturbed, but the cavity washed out as well as possible with a weak bichloride solution, 1–5000, followed by a 1–16 boroglyceride solution. A large rubber

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drainage tube was left in. The peritoneum was closed with catgut, and the remaining parietes with silk sutures. Dry iodoform and bichloride gauze dressing.

The tube was removed the next day; sutures taken out at the end of a week. Union was complete, except the drainage opening. One stitch had suppurated, and through this opening there was some drainage, the fluid containing now flakes of lymph and becoming darker colored.

As to the condition of the patient, it seemed at first a little improved, but in a few days he began to lose ground steadily again. The abdomen refilled. At the end of a month it was again opened. There were firm adhesions all about, and it was impossible to get far in the attempt to cleanse the cavity. The course of the disease was not much modified, either for better or worse, by the surgical treatment. The patient gradually failed, and died six weeks after the first, and two weeks after the second operation. No autopsy was allowed.

Case II.—E. C. entered the Memorial Hospital in my service Jan. 30, 1890. I had seen her in consultation a few days before, and supposed she had an ovarian tumor. She was a thin, pale, worn-looking woman of 29. Had been seven years married; two children, 6 and 3 years old. Family history, negative. She stated that one and a half years ago she had been in poor health for some months; but I failed to learn then, as I did afterwards from a former medical attendant, that she was at that time supposed to be phthisical. A month before entrance she had first noticed a tenderness of abdomen and a pain about pelvis. Her attention thus attracted, she observed a swelling of abdomen. Has lost much flesh; has had some nausea; frequently required opiates for abdominal pain. At my first examination the abdomen was full, not tense, somewhat tender, and I could feel bimanually an elastic, nearly median tumor, apparently with pelvic connections, in size something less than a child's

head. At a later examination I could not make it out so plainly, and the percussion was a little at variance with the idea I had formed. Still the ovarian idea was not dislodged from my mind. There was a small amount of ascites. The uterus could be felt anteriorly, and measured 2½ inches. Examination of urine gave a slight trace of albumen; otherwise negative.

Feb. 14th. Patient was lightly etherized and the abdomen opened by median incision below umbilicus. The parietes were very unusually vascular, one artery spurting fully a foot. The tissues were very friable, so that bits would crush quite off in the compression forceps. No tissue structures, muscle, linea alba or omentum were recognizable. Entrance to the peritoneal cavity was indicated by a gush of ascitic fluid,—greatly to my relief, for I was much afraid of opening intestines. Putting in my finger, I seemed to feel a tumor everywhere adherent to the parietes. Tearing adhesions when I could—some were too strong—I followed the tumor into the pelvis, behind the uterus, which was quite smooth and free from adhesions. At a short distance from the uterus, both broad ligaments disappeared into the mass. An enlarged incision showed the tumor to consist chiefly of intestines matted together. There were no sulci between the folds, but an even translucent surface presented, through which the coils of intestine could be faintly seen. The amount of ascitic fluid escaping as adhesions were torn was a pint or two, of turbid straw color, with flakes of fibrin. There was considerable hæmorrhage from adhesions. There was nothing to do; the adventitious tissue surrounded the intestines like a mould, and it was impossible to free them. The bleeding was stopped with hot water and the wound closed. A rubber drainage tube was left in.

On the next day the tube was replaced by an iodoform ribbon, though there was no profuse discharge. Sutures

removed in ten days; union complete except at point of drainage. Three weeks after operation the record is: "Since operation patient has had less pain and taken more nourishment, but her general condition has not been changed. The temperature has kept along about as before, ranging from normal to 101½—except for a few days after operation, when it rose to 102½. It was found subnormal only once. Pulse before operation, 110–125; after, 100–110. The bowel movements became natural after the operation, which they had not been for a long time before.

March 8th, she wanted to go home and was discharged. The drainage opening never closed, though there was never any great discharge. This fistula became fæcal after she went home, and she died of exhaustion about five months after the operation.

Here are two cases of tubercular peritonitis in which abdominal section was done with no good effect. Neither do I think the fatal termination was materially hastened thereby. Where was the fault in these cases? I shall inquire whether the operation of abdominal section for tubercular peritonitis is ever justifiable, and if so under what circumstances and in what way. First, a word as to diagnosis. The diagnosis of tubercular peritonitis is frequently difficult, and thus far has proved often impossible. Under the encouragement of a chance for cure, the diagnosis will be more frequently made and fewer cases will pass for typhoid fever and ovarian tumor. In a table of 71 operated cases of tubercular peritonitis given by Maurange[1] in a thesis last year on the subject of "Surgical interference in tubercular peritonitis,"—of these 71 cases the diagnosis was made before operation in 14, or one-fifth; while in 40, or well above one half, the preliminary diagnosis was ovarian tumor. As the question is more closely studied, more indubitable diag-

[1] Maurange. De l'intervention chirurgicale dans le peritonite tuberculeuse. Etude critique et statistique. Paris, 1889.

nosis will be required, especially to discriminate from chronic peritonitis without tubercle, in regard to which pathologists are at variance—some thinking it common, others rare. Diligent search ought to be made in each case for the tubercle bacillus, not in the fluids, for a negative result there is the rule, but in the tissues themselves, or perhaps in scrapings from the surfaces of the cavity. The proposal of inoculation of animals is made, but so many of these experiments have been negative that not much confidence is put in this method. The question whether abdominal section is ever justificable is, I think, pretty well settled, and especially so in this locality by the work of Homans, Cabot, Elliot and Bradford.

However, text-books up to the most recent editions agree in regarding tubercular peritonitis as a hopeless disease. A newest text-book, however—Taylor's Hand Book of the Practice of Medicine—has this: "A considerable number of cases have now been successfully treated by opening the abdomen, washing out and sponging the surfaces of the peritoneum and inserting a drainage tube."

Tait, in the Edinburgh Medical Journal, Nov. 1889, says in his usual broadcast way: "That a therapeutic change is effected in the peritoneum itself by the mere opening of the cavity is now universally recognized in the treatment of what we call tubercular peritonitis by abdominal section. I have now had a large experience on this point, and can say positively that we can cure permanently and speedily, cases that have gone even so far as suppuration by opening and cleansing, but in bad cases the cleansing is in all probability not complete, no matter how much care and time is spent on it, and in the non-purulent cases I very often do no cleansing at all, but merely empty out the serum and put in a drainage pipe. Yet the great majority of these cases are cured by these simple means." Somewhere else he says 80% are cured. I have myself no doubt that this strong statement will have to be modified.

XUM

Formerly if one maintained the curability of tubercular peritonitis one's diagnosis was questioned. But that position of doubt cannot be held. The results of autopsies in general are enough to refute it. The record of any pathologist of large experience would furnish cases of latent peritonitis in persons who had died from other causes.

Pribram[2] of Prague, writing in 1887, and dealing with a total of 3500 autopsies, found 165 in which tubercular peritonitis existed. Most of them died, not of the peritoneal disease, but of pericarditis, pleurisy, meningitis or tuberculosis of lungs. The peritonitis was a secondary matter and often retrograde. It was only in a few of the cases that the peritonitis was the cause of death.

Osler[3] details several cases, when, after death from pulmonary tuberculosis, the traces of peritoneal tubercles cured, or in process of cure, were found. Moreover, Pribram found no cases of chronic exudative peritonitis among the 3500 autopsies, which is incompatible with the idea that this form of disease—the non-tubercular sort—is so common as to account for all the cases which are diagnosticated tubercular peritonitis, and which get well under medical treatment. Other observers, to be sure—Spaeth, Welch, Prochownick—hold a contrary view; that there is a form of simple chronic peritonitis with quite similar fibroid nodules, but in fact not tubercular. Such a difference in view must at least indicate a considerable rarity of the simple form.

If any further proof were necessary of the curability or recoverability of tubercular peritonitis it is most indubitably furnished by the experience of modern surgery. Since abdominal section has become common, numerous cases have occurred in which the retrograde process has been

[2] Pribram. Ueber die Therapie der Peritonitis tuberculosa mit besondere Berücksichtigung der Laparotome. Med. Chir. Centralbl. Wien, 1887.

[3] Osler. Tubercular peritonitis. Johns Hopkins Hospital Reports. Vol. 2, No. 2.

observed either in the living body or in the body dead from other causes after longer or shorter interval. Pribram gives the case of a woman discharged from hospital relatively well of an illness diagnosticated tubercular peritonitis. One and a half years later Breisky did an ovariotomy on the same patient. Microscopic examination of the peritoneum at the time of operation showed the remains of tubercular disease, and bacilli were even then present.

Ceccherelli[4] operated on a boy of 11 in whom ascites was the only physical sign. The peritoneum was covered with tubercles. The ascites had returned in a month, so that laparotomy was again done. The number of tubercles had greatly diminished, and those remaining were found covered closely with recently formed connective tissue, thus showing the method of repair in these cases.—Osler gives a very interesting case in point, which I will not detail. He says of it: "Surgically the operation was a success, as the symptoms were relieved and she left the hospital looking and feeling well. Then death following a short illness gave an opportunity of studying the condition of the peritoneum four months after. The tubercles were found undergoing fibroid change, but still retaining their characteristic structure and still rich in bacilli."

In a list of 41 cases of abdominal section for tubercular peritonitis reported by Kümmel[5] in 1887, are two where the miliary tubercles were seen on the peritoneum at the operation, and were not to be found at all at the autopsy after death a few months later. Ahlfeld[6] reports a similar case 1½ years after operation. In addition to these proofs, furnished by autopsy and microscopical examination of retrograde processes set up after operation, we have the clinical history of many cases which have improved in health, or, so far as we can say, have got well, after laparo-

[4] Ceccherelli. Abstract in Braithwaite's Retrospect. January, 1890.
[5] Kummel. Arch. f. Klin. Chirurgie. 1888.
[6] Ahlfeld. Quoted by Osler.

tomy. Building upon this, men have begun within the last few years to operate for the tubercular disease alone, when it could be diagnosticated, and with what success I will endeavor briefly to indicate. It is not essential to my purpose to separate the cases in which the diagnosis was previously made.

As to the proportion of operative cases cured it is a question which it is not possible to answer in any but a vague, indicative way. It is common in cases of tubercular peritonitis—even symptomatic in their clinical history—that there should occur periods of quiescence or obsolescence—the disease advances with remissions and exacerbations. In an analysis by Vierordt[7] of 24 *clinical* unoperated cases, there was one finally fatal after a remission of three years, and this is only an example of a class of cases observed by him and others. This fact keeps the cures for a long time doubtful.

It is of little importance to know the number of cases in which the operation is *surgically* successful. There is not much danger in the operation, less it would seem than in a laparotomy where the peritoneum is healthy. The thing is to know when permanent benefit is to be hoped for. There is next to no danger of the operation itself being fatal, though, to be sure, some such have been reported. Maurange tabulates 71 cases of abdominal section for tubercular peritonitis. Osler, in a recent article in the Johns Hopkins Hospital reports, adds 26, and I have gathered 29 others. Making in all 126 cases.

Assuming that survival one year after operation entitles a case to rank as successful, I find among 126 cases 37 such, or 30%. There is nothing accurate about this, for many of the cases in my table were reported within a year of the operation, so could not possibly come into this category; still it gives an idea. It shows that the number of cases

[7] Vierordt. Ueber die Tuberculose der Serösen Häute. Zeitschr. f. Klin. Med., B. 13, H. 2.

surviving 12 months must, at all events, be more than 30%. Most of these surviving cases were reported "well" at the end of the year, but I am unable to make any satisfactory estimate of the number of complete cures in this list.

Of the 55 cases which I have selected, outside of Maurange's table, 36 were living, and most of them called well, at various intervals from one month to four years, that is 66%.

Again, of the 55, 8 were living and explicitly *well* at the end of a year. This would make a rate of cure nearly 15%. This is certainly below the true proportion of 12 month cures, since a large number of this series of 55 were reported within less than a year of the operation.

These figures,—30% of 126 cases surviving at the end of a year, and 15% of 55 cases *well*, apparently cured, at the end of a year,—are certainly encouraging, in view of the quite hopeless fate formerly apportioned to the victims of this disease. These facts show no such victory as Tait celebrates when he claims 80% of cures, but still a victory.

The calm facts are that certain cases of tubercular peritonitis are open to surgical cure. Although no general cure has been discovered, a step in advance has been made.

Now as to the kind of case which promises good results after operation. Not all cases of tubercular peritonitis are to be operated on, by any means. A certain number get completely well without operation, and another number is outside the possibility of help. A certain group of cases are unhesitatingly to be operated upon, another group are to be unhesitatingly let alone, while in others the question must be decided on individual merits. It is impossible to settle the question by tables of symptoms, but I will enumerate a few of the indications and contra-indications, prefacing that the general condition of the patient will perhaps settle the question of operation or no operation, as often as anything.

First. Indicating operation:

1. Abundant ascites.
2. Absence or small amount of solid masses.
3. Disease primary in the peritoneum, though the mere presence of tuberculosis elsewhere does not forbid operation. Some cases have apparently recovered entirely, when there was slight coëxisting disease of the lung, both peritoneum and lung becoming healthy.
4. Encysted disease, *i. e.*, serous or purulent pockets.
5. Intestinal Obstruction.

In the last two, operation is imperative.

On the other hand, contra-indicating operation:

1. Absence of ascites.
2. Abundant masses or strands.
3. Secondary to advanced general tuberculosis.
4. Intestinal ulcers.

The last two forbid operation.

As to method of operating. The abdomen should be cleaned out as well as possible, by flushing with hot water, and sponging; separating meanwhile any adhesions which can be broken without injury to the viscera. No antiseptic and no drain, unless for some special reason, as for instance hæmorrhage.

Tapping should not be practised. There is danger of doing harm, and it cannot do so much good as laparotomy.

Returning to my two cases, I should still advise operation in the first case, that of the man, with ascites and light adhesions, though I think it ranks with doubtful cases and perhaps should be excluded on account of its acute character, its rapid and uninterrupted course. It would certainly have been better to break up adhesions everywhere, so laying open any loculi there may have been, and making a more thorough peritoneal toilet.

The second case was operated under mistaken diagnosis. Had the diagnosis of tubercular peritonitis been made before

operation, the absence of ascites, the presence of so much solid mass, and its probably secondary character, would have contra-indicated operation.

In neither case would I put in a drainage tube, for it does no good, unless of course there is some special indication, and the tube track is very likely to remain fistulous, or even become fæcal, as in my second case, by ulceration through the intestinal wall from the outside.

DISCUSSION.

Dr. A. T. Cabot, of Boston:—In regard to the indications for operation for tubercular peritonitis he was closely in accord with Dr. Wheeler. He thought the cases which were really favorable were those in which there was a large amount of ascitic fluid. Cases in which there were large masses of cheesy material in the peritoneum, or cases in which the intestinal wall or post-peritoneal glands were affected, were certainly much less favorable either as regarded cure or long immunity. In the cases he had operated upon a sufficient length of time had not elapsed since the operation to enable him to add much to what Dr. Wheeler had said as to the permanency of the cure. There were cases on record of long standing immunity, notably the first operation as far as he knew done for this disease by Sir Spencer Wells, who operated thinking he had a case of ovarian tumor. He simply removed the fluid, and the patient 25 years after the operation was in good health. Such cases encouraged one to operate on all doubtful cases. These cases did not promise well under "let alone" treatment, and if the operation gave any real hope it ought to be done. The process by which the disease was brought to a standstill after operation and in some cases made to disappear was by encapsulation. The first step in the process was the accumulation of round cells around the tubercle. In fact what was known

as a "miliary tubercle" was largely composed of these round cells which were really the cells thrown off in consequence of the irritation of the bacilli. These round cells finally turned into fibrous tissue, and presently the tubercle was shut up in a fibrous capsule. If that fibrous capsule shrank it produced pressure on the tubercle and caused it to disappear. At any rate it encapsulated and shut the tubercle out from the lymphatic and blood circulation. In peritoneal tuberculosis, however, the tubercles were not surrounded by tissues which could throw out a wall around them. The tubercles lay on the surface; they projected into the fluid surrounding them. In many cases the tubercles were seen as little grapes, or like shot hanging out into this fluid. They were not surrounded by tissues which could encapsulate them, but by nutrient fluid which promoted their growth. The operation thoroughly removed for a time, at any rate, this fluid, and thus enabled the surfaces which were irritated by the presence of the tubercles to come together, and to become adherent to each other; in that way the tubercles were shut up in the tissues, which could then throw out fibrous tissue around the bacillary accumulations. In that way it seemed to him the operation was of service, and that the thorough removal of the fluid was the important step in the operation.

He firmly believed in the treatment of general purulent peritonitis by laparotomy, because he believed that those cases had their origin in some local condition, were primarily cases of local peritonitis; and the chances were often good of finding and remedying that local condition by operation. Of course the first cause for these cases of peritonitis which occurred to one was appendicitis. That, however, was too large a topic for discussion at this time. Another common cause was a salpingitis, which groped on and presently infected the peritoneum. He had seen very good results following operation upon these cases. In both of these classes of cases he thought the removal of the primary cause of the peritonitis, if it could be discovered, was of the greatest importance. The other common local cause was perforation of the various portions of the intestinal canal. There unfortunately the surgeon could not do very much to remedy the cause of the peritonitis, although some cases had been reported where suture of the opening,

or excision of the ulcer and suture of the intestine, had given good results. Even in those cases, however, we could do a great deal by giving a free exit to the excrementitious products and to the pus which was in the abdomen.

In regard to the method of operation it seemed to him of the greatest importance that the peritoneal toilette should be thorough, with as little added injury as possible to the peritoneum. He did not know anything that would accomplish this cleansing more thoroughly and satisfactorily than a current of hot water, and no better way of applying it than through a tube. He used a Tait's trocar. The hot water was thus carried through a tube of large calibre down into the most dependent parts of the peritoneal cavity. The localities to be especially attended to in this way were the pelvis in the first place, and secondly the loins behind the ascending and descending colons. All who had seen autopsies in these cases knew how the mesentery appeared, how the different folds lay together and were filled with purulent flakes and with free pus. If the stream of water was directed against the root of the mesentery, first on one side and then on the other, it would rush out along the mesentery and would remove as thoroughly as was possible this purulent fibrin and the liquid pus pent up in those regions. These points should be especially borne in mind in all of these cases, in order that the washing might be so applied as to be of the greatest service.

Dr. R. H. Fitz, of Boston :—The classes of cases which Dr. Wheeler had presented to us are so widely different that it seemed hardly fair to consider them altogether as cases illustrating the effect of a laparotomy for a general peritonitis. In one of the cases it seemed to him that it was very much open to doubt whether it was fair to call it [the second] one of general tubercular peritonitis. From the description of the symptoms of the cases it appeared to him that the peritonitis was rather circumscribed than general. Unfortunately the evidence which would enable the opinion to be formed with reference to the distribution of the disease by post-mortem examination could not be furnished. In this class of cases, so far as he had seen them, as a rule the diagnosis was open to doubt. It might be safely said that the

great majority of them occurred in women or in girls, and those were the cases in particular in which one had to consider the possibility of some pelvic source of the peritonitis, of the tubercular process, and which after operation were likely to do exceedingly well in the main. He has recently seen a young woman in whom a tubercular peritonitis was pretty extensive, nearly over the entire abdomen, where the fluid was held in by adhesions. Fluctuation was with difficulty transmitted. The suggestion was as if a thin walled cyst were present. This woman was seen by Dr. Strong in the first instance, then by Dr. Homans and myself, and we all felt that this was probably a cyst of the broad ligament. Dr. Homans operated and found it a case of tubercular peritonitis.

The class of cases as he recalled them which seemed to have done best in consequence of a laparotomy were cases which it was better to characterize as peritoneal tuberculosis instead of tubercular peritonitis. Dr. Cabot said those cases which he found to do well were those in which there was a large quantity of fluid present. They were in all probability the cases which in years gone by had been successfully treated by puncture. There was no positive evidence in these days with reference to the actual nature of the process, but many present had probably had cases of peritoneal dropsy which recovered after the operation of tapping, and no disease of the liver existing. But these cases of tubercular peritonitis properly deserving of the term, such as the first of the cases reported by Dr. Wheeler, it seemed to him were almost invariably going to do badly after operative treatment. In them the tubercular process had extended out in the main from the intestines; they occurred in both men and women, cases of the old tabes mesenterica, intestinal tuberculosis, very likely associated with pulmonary tuberculosis, even if independent of general tuberculosis, and operation gave no prospect of benefit.

The question which Dr. Wheeler had raised in connection with his second case it seemed to him was one with reference to which there might be a greater possibility of doubt. He thought that at the present time surgeons would probably not question the expediency of opening the abdomen in a case of peritoneal tuberculosis with a large quantity of fluid present. Such conditions were often

found in persons apparently in blooming health. In the second class of cases, however, where there was a spreading peritonitis, purulent or fibrino-purulent, the question was one which might be considered from two points, and here again he thought Dr. Cabot had hit the nail on the head; it was not a question as to the desirability of laparotomy in a general peritonitis, but the desirability of laparotomy to prevent a general peritonitis. When the general peritonitis was established, in his opinion an operation was of very doubtful expediency. The individual was so far in a septic condition that an operation as a rule simply hastened death instead of saving life. Many of the cases of so-called successful treatment of general peritonitis by laparotomy were probably not cases of general peritonitis, only of general abdominal distension, tympany, etc. Cases which had recovered in consequence of the operation, or after the operation, were it seemed to him in the main where the peritonitis was not a general one at the time of the operation, but localized, and in that class laparotomy was urgent and should be performed without hesitation. It is from this point of view of the greatest importance that the physician should consider in his individual case not that he has a case of peritonitis, but a case of disease of the tubes, or appendix, or stomach, or liver, or gall-bladder, which is likely to produce a spreading and general peritonitis, and that for general peritonitis itself operation is of very doubtful value, but that before the peritonitis had become general, while it was beginning to spread, then laparotomy might save the patient.

General spreading peritonitis was often seen in young menstruating women who had sudden stoppage of menstruation, peritonitis, violent pain and death in the course of a few days. The history was quite like that of perforation of the bowels; there is no time to wait, whereas in pyosalpinx, the convenience of the surgeon could very often be consulted. It was important to bear in mind not that we might have to do a laparotomy in general peritonitis, but that a case of ulcer of the stomach, or of inflammation of the appendix, or of inflammation of the tubes might at any time give rise to a spreading peritonitis, and to prevent that peritonitis becoming general was what was demanded.

Dr. J. W. Elliot, of Boston:—He fully agreed with Dr. Fitz that in discussing this subject we should separate the forms of peritonitis, that we had now come far enough along in our knowledge to separate, at least in a general way, the forms for discussion and in most cases for the question of operation. If we discussed the question of operation for general peritonitis as such it resolved itself into the question of whether we should do an exploratory incision. What we want to find is the origin of this general peritonitis. All he had to say on that subject in a very general way was that if a case of peritonitis was a very blind one and it was a question of exploratory incision to find out what the origin was, that so far as the incision through the abdominal wall went, that was not serious and could not do much harm. When one had got through the abdominal wall and pus did not gush out at once, search must be made for the origin of the trouble. This he thought took the most skill of anything in abdominal surgery. If it proved to be a case of appendicitis, if that was the origin and one was not quick to recognize it, suppose it not to be a very general peritonitis as yet, if one pulled apart the coils of intestines and mixed them up and got the pus and gangrenous parts that formed the abscess wall into the general peritoneal cavity, one did a great deal more harm than good; in the same way if there was a perforation of the colon, or of the small intestine, and it was walled off, a surgeon who believed in laparotomy for general peritonitis too generally and went in to clear everything out, in his opinion was very apt to do a great deal more harm than good; so what he had to say about operations for general peritonitis in general, where the origin was not known, was practically that an exploratory incision should be made with the greatest caution, and only by one thoroughly familiar with all the forms and origins of general peritonitis, and quick to be led in the right direction and not in the wrong direction.

Tubercular peritonitis seemed to him one of the most fascinating parts of abdominal surgery, and he had been very much interested in what all the gentlemen had said. He had had a fortunate experience in tubercular peritonitis, having had two cases, one case operated on three years ago in a little girl who had gained flesh and was now very fat, hearty and perfectly well; another case was one of tuber-

cular salpingitis with tubercular peritonitis of most of the pelvic wall, which was operated on two years ago and was now perfectly well. This last case in a certain sense contradicted the general opinion expressed that cases where there was no free fluid were not appropriate cases for operation. This case had a bunch of tuberculous cheesy matter in the tube and around the tube with no ascites whatever. That was cleared out and had never returned, so that it was not necessary that there should be a large amount of ascites. So far as the cause of tubercular peritonitis went, about all he had been able to find out was that it probably came in almost all cases from tuberculosis of the genital tract. In proof of that we found peritoneal tuberculosis in women vastly more common than peritoneal tuberculosis in men. General tuberculosis was equally common in men and in women. If peritoneal tuberculosis was more common in women than in men, that made it probable that it came in some way from the sexual apparatus. In men genital tuberculosis ran an entirely different course—up the prostate, into the bladder, kidney, etc.; in women through the uterus, out the tubes and into the peritoneal cavity. Now the other facts that spoke in this direction were that in women tuberculosis beginning was almost always found in the pelvis; when it was not extensive it was almost always more intense about the tubes and in the pelvis, and it was safe to say most of the operations had been for pelvic tuberculosis.

As to the diagnosis of peritoneal tuberculosis, one point is that the fluid is not necessarily free fluid. If one tried to diagnosticate peritoneal tuberculosis principally on the evidence of free fluid, one would be mistaken. In the case he had spoken of the loins were tympanitic, the top of the abdomen was dull, which showed in a general way that the tumor floated on the intestines. The ovarian tumor floated on the intestines. Free fluid sank in the loins and made dulness in the loins, and the intestines above were tympanitic. After the operation that was more satisfactorily explained. Tuberculosis had attacked the mesentery, that had shrunken in the intestines and bound them down to the spinal cord and back of the abdomen; therefore they could not float up on the fluid and made tympanitic percussion in the loins and dulness above; also when the fluid was walled

off between the intestines one got sometimes a percussion note of dulness and a tympanitic note corresponding to a cyst; it was a cyst, encysted fluid. These cysts in tubercular peritonitis were very characteristic to the touch. They fluctuated, and yet with a sense of vagueness of outline. One could not feel the cyst wall; where one should feel it, it was very vague. When one had this in mind he thought it was of the greatest assistance.

He would like to add, that in the case which had now remained well three years the diagnosis was made before the operation; and later the tubercle was found by the microscope.

Dr. H. O. Marcy, of Boston:—He was reminded by Dr. Adams of the first case that came under his observation, where the doctor and himself made an exploratory operation. It was that of a child only five years of age, where on tapping the abdomen full of fluid looking like laudable pus, but which proved to be almost a pure culture of the micrococcus, they felt that it was wise to make the examination more thorough. On opening the abdomen to wash out the cavity thoroughly, they fortunately had the good result of a cure, for the child remains well to this day, some six years after. Secondly a case of tubercular peritonitis about three years ago. A young woman had a certain something creeping up from the pelvis. What that was he had not the remotest idea until the examination was made. To the surprise of the gentlemen present, a general peritonitis of the miliary type was found, and on taking a piece of the tissue and sending it directly to the laboratory they had the good fortune, the first and last on record, of making a pure culture of the bacillus tuberculosis from it. That woman, eighteen months after the operation, went to Europe, and was in fact so well that she did not care to report to her physician. In that case the diagnosis was not assumed, but demonstrated. In reference to the discussion of Dr. Wheeler and some of the speakers as to how one is going to diagnosticate a tubercular peritonitis before operation, he should still remain uninstructed after what he had heard this afternoon. He did not see how one was going to make a diagnosis until after an exploration for the sake

of diagnosis, and then one was prepared, and not until then, to know with what one had to deal and how one should deal with it.

In reference to the general acute peritonitis an illustrative case under observation within a month was worth sketching. A young lad, hitherto healthy, last winter had two or three attacks of "colic." About five weeks ago he was seized with sudden inflammatory trouble of the bowels. But there came on that development of characteristic symptoms so that Dr. Nelson said this boy was going to die unless something was done. On opening the abdomen a band of adhesion was found in the right iliac quarter, making intestinal obstruction. The fluid, in not very large quantity, was generally a purulent fluid, and the lymph which he had never seen in a condition like that had covered over in the exudation a good many of the folds of small intestine; it was disseminated through the whole cavity. The cavity was washed out with 1 to 2000 bichloride. Then followed an abundant washing with sterilized water, and the boy is now widely out of danger.

Case III.—This case occurred within a week and illustrated a point which Dr. Elliot wisely raised—"What was the trouble?"—the first question which every man present would ask. A woman was struck with a ball in the left side just above the umbilicus. At the time she was supposed to be quite well. She went to bed and was very sick. The doctor in attendance said he thought the woman was going to die. Pulse 140; temperature subnormal; abdomen full of fluid. On tapping the abdomen fourteen pints of fluid were withdrawn, which on examination proved to be almost a pure culture of the micrococcus. What was to be done? He thought little, perhaps nothing. An exploration was made, and quite to our surprise a solid tumor of the pelvis was found. The autopsy four days later showed it was cancer of the left ovary. This was a rare condition in a woman of 29. In fact she had borne a child within a year, and three weeks ago was supposed to be thoroughly well. She was struck with the foreign body certainly many inches away from the cause of the trouble.

All these cases were illustrative of the extreme difficulty of diagnosis, and he could not understand how we were to hope for the wisdom of diagnosis that should make us able

to operate with anything like accuracy until after we had made our autopsies, and that was why we had been discussing the question to-day. We had been making autopsies a hundred years and more, and we were here to-day to see if we could discover something to save lives in a class of cases that came under observation every day. This class of cases had drawn together so many in discussion because it was of vital, practical every-day interest, not to the half-dozen men of the representative class of Dr. Elliot. His services were of value to the general practitioner, but the general practitioner should first make the diagnosis.

Dr. Z. B. Adams, of Framingham :—He would only like to emphasize if possible the distinction which seemed to him to exist and be perfectly tenable between tubercular peritonitis and acute purulent peritonitis, which he believed to be a disease apart and distinct from tubercular peritonitis. The case to which Dr. Marcy had alluded was in point. In it there was a history showing no tubercular taint in the child. There had never been any symptoms or signs of any tubercular disease about the child. The child was perfectly healthy, and the symptoms that first developed were those of a mild dyspeptic character, as though the child had eaten something that did not agree with it,—a mild type of fever, loss of appetite, little restlessness at night, and in certain parts of the day a little rise of temperature. These symptoms came on after a too great indulgence in certain kinds of food; were traced by the mother to overeating. He continued to treat it as a case of indigestion until the abdomen became enlarged. The abdomen was not tender or tympanitic from the beginning; no hectic fever; no symptoms that could be called tubercular at any time. This case lasted only three weeks from the outset before there came to his sense the almost certainty that pus was accumulating in the abdomen. He asked Dr. Marcy to see the case. They tapped between the umbilicus and the pubes and got pus,—a pure culture, as Dr. Marcy had said. It was then decided to open the abdomen, which was done after a week's time, that is four weeks from the commencement of symptoms. On opening the abdomen there flowed out perhaps two quarts of pus. At the time of the opera-

tion the condition of the child was this: great emaciation, slight fever, the temperature occasionally rising as high as 102, never higher, occasionally subnormal; a swelling of the abdomen large enough to compress the heart and push it up so that the apex beat was an inch above the nipple line. The condition was one of such extreme exhaustion that he almost feared to do anything, lest the child should die under the operation. On opening the cavity and looking in and feeling as far as possible, it was found that wherever the surface was touched blood came away. They explored the organs, and there could be no doubt whatever that it was a general peritonitis, and not a localized cyst of any form. The abdomen was thoroughly washed out simply with boiled water to which only a very minute portion of carbolic acid was added. The abdomen was closed as rapidly as possible. The child got into such a condition that it was necessary to resort to artificial respiration to restore it before closing up the abdomen. The question arose in his mind: Where did this pus come from? As to its having been a degeneration of tubercle he could not believe that was possible. That it arose from a salpingitis seemed to him incredible. That there was some appendicitis or some connection with the intestine he thought the history proved. The child rapidly recovered, and now at the distance of six years is a large, well grown very healthy girl.

Dr. C. C. Tower, of South Weymouth:—I noticed one remark made by Dr. Cabot, namely, the importance of removing the fluid in cases of general peritonitis. In a case which I sent to Dr. Homans, and of which he had the subsequent care after her discharge from the hospital, the fluid was not removed. There was merely an exploratory operation to see whether there was disease of the ovaries, and as soon as it was ascertained by him that it was tubercular peritonitis he merely closed the wound without removing the fluid. Primary union took place, but subsequently, as the fluid re-accumulated, the lower part of the wound opened, and the fluid leaked away through the opening. Dr. Tower had the care of the patient for several months afterwards. She recovered and married, and was at present, so far as he knew, well. The point he wished to make was that the fluid

was not removed, that it was merely an exploratory incision. It was one of the early cases before the profession had been instructed up to the point of operating in cases of tubercular peritonitis.

Dr. CABOT:—He was reminded by seeing Dr. Tower of one point he intended to make, and that was the importance of second operations. In these cases of general purulent peritonitis there was often much sacculation, and all of the pockets might not be opened at the first operation. This was illustrated by a case in which he had operated for Dr. Tower, where a second operation was necessary to reach a second accumulation of pus. The first operation was in the loin to remove pus which Dr. Homans had located and partly removed by aspiration, and the second operation three days later was a median incision for the removal of pus from the region about the appendix. The intestines were so tied up that the appendix could not be seen. He thought it very important for every surgeon in taking the care of one of these cases of appendicitis by incision to stand ready for a second operation if it were called for.

Dr. A. WORCESTER, of Waltham:—One point had not been brought out in the discussion, namely, the question of operating for peritonitis during the lying-in period. That disease used to occur in Boston; he believed it did not at present, but unfortunately it did sometimes occur in the country. He was lately called in consultation to see a case of puerperal peritonitis, where he was not bold enough to operate when he should. The woman did remarkably well for two days after delivery. On the third or fourth day she had a chill and well marked symptoms of septicæmia, and immediately striking symptoms of general peritonitis. There was no fluid to be found by percussion, nor had he ever been able to find fluid in the abdomen by percussion. He did not know what that meant in cases of general peritonitis. The abdomen was so distended in such cases that it was resonant all over. In this case he hesitated 48 hours; and he believed lost the life of the patient by that hesitation. When the peritoneum was incised, there escaped perhaps a quart of sero-purulent fluid, with

abundant flakes of lymph. The patient was very low and he had only time to wash very thoroughly with hot water. After the fluid had escaped clear for some time he found a considerable body of pus by stirring round in the left iliac fossa. As soon as the water came away clear he closed the wound. The patient died in the evening of the first day. He thought the patient could have been saved if he had dared operate when the peritonitis began,—48 or 56 hours after her delivery. He was determined in the future, if ever he found general peritonitis occurring in the lying-in period, to operate when he found it, disregarding entirely the fact that the uterus might be still enlarged and up as high as the umbilicus.

Dr. W. C. B. Fifield, of Dorchester:—In such cases as Dr. Worcester had described Mr. Tait advocated not only section of the abdomen and removal of the fluid, but also amputation of the uterus. In that way he not only cured the patient by removing the *fons et origo mali*, but also defended her from ever coming into such imminent peril again. The propriety of this remained to be proved.

In regard to peritonitis, there were a great many forms. Dr. J. B. S. Jackson used to tell us that when at the autopsy tubercles were found at the base of the brain, they would be found in every other part of the body, *i. e.*, scattered over the surface of the lungs, over the pleura, over the peritoneum, etc. His own limited experience confirmed this statement. That was one kind. One could scarcely hope to cure a tubercular peritonitis if such a state of things existed. Another form was where tubercle lay in masses in the cavity of the peritoneum, in the Fallopian tubes, choking them. Those were no doubt the cases in which on removal of the tubes recovery took place.

Next there was purulent peritonitis, in which the abdomen was a vast abscess. A surgeon of the south of France published a series of cures of peritonitis, where the pus had formed an opening at the umbilicus through which it was discharged. There was another form of peritonitis of which he had observed only one instance,—granular peritonitis. It was a chronic peritonitis in which the whole surface of the abdomen, intestines and all, was covered over with

grains of some material like the grains of sago or rice. Such an instance he once saw in the post-mortem room of the City Hospital.

Therefore it seemed to him while we spoke of curing acute peritonitis by abdominal section, and washing out the peritoneal cavity, it behooved us to establish what those cases were which were cured by operation, and to which the name peritonitis was given; and to find out that form of peritonitis which, disseminated throughout the peritoneum, brain or pelvis, was incurable by any operation whatever.

DR. WHEELER:—It is possible to make the diagnosis in a good many cases of tubercular peritonitis. It has been done a good many times. Dr. Marcy was not the first man to cultivate bacilli from the fluid in tubercular peritonitis. In the series of 41 cases, to which he had referred in his paper, there were five in which the bacillus was found, all of which cases recovered.

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TRANSACTIO

ARTICLE IX.

THE ANNUAL DISCOURSE.

JAMES THACHER, M.D

OF

PLYMOUTH, MASS.

By JAMES B. BREWSTER, M.D.
OF PLYMOUTH.

DELIVERED JUNE 10, 1891.

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NOTE.—At an Adjourned Meeting of the Mass. Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses. nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publication be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

JAMES THACHER, M.D.

OF

PLYMOUTH, MASS.

MR. PRESIDENT AND FELLOWS
OF THE MASSACHUSETTS MEDICAL SOCIETY:

FROM the settlement of the colonies until the end of the first quarter of the eighteenth century medicine in this country can hardly be said to have existed as a distinct profession.

Almost the only medical practitioners were the clergy, many of whom combined with their pastoral duties the healing of the sick.[1] They ministered to both body and soul in a manner alike heroic. Among the medical authors of that time appears the name of Rev. Thomas Thacher, the author of the first medical publication in America, issued in 1677, entitled "A Brief Rule to Guide the Common People of New England, how to order themselves and theirs in the Small Pocks and Measles."[2] Also of Cotton Mather, Jared Eliot, and other clergymen; contributors to the scanty literature of medicine.

Scattered throughout the colonies there were a few regularly educated physicians, but their number was small, and their influence limited.

At first they were graduates of the different European schools; later, some of the graduates of

[1] Historical Sketch of State of Medicine in America. John B. Beck, M.D.
[2] Contributions to Annals of Medical Progress, p. 20.

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American colleges sought in Europe opportunities for professional instruction not attainable in America. Two of the early presidents of Harvard College, Charles Chauncey and Leonard Hoar, were graduated in medicine at Cambridge, England.[1]

John Clark,[2] an English physician, practised in Boston from 1638 to 1664. William Douglass, M.D.,[3] a Scotchman, educated at Leyden and Paris, who is remembered as Boylston's unscrupulous opponent in the practice of inoculation, was a practitioner in Boston, of great repute, from 1716 to 1750. Dr. Thomas Boylston, the father of the introducer of inoculation, was a graduate of the University of Oxford, and settled in Brookline in 1635. Later we recall the names of Isaac Rand, William Aspinwall, John Cutter, Thomas Bulfinch, Benjamin Gale, John and Joseph Warren, and others who might be mentioned as eminent and skilful physicians of the time.

Yet, notwithstanding these most illustrious exceptions, we must remember that the great mass of practitioners of medicine previous to the Revolution were ignorant pretenders, without a medical degree, or any warranty save that they had served an apprenticeship with some local dispenser of herbs and the more disgusting remedies then in vogue.

It is difficult to appreciate how low the standard of medicine then was. Dr. Beck says in his

[1] Annals of Medical Progress, p. 13. Joseph M. Toner, M.D.
[2] Ibid., p. 13.
[3] Ibid., p. 22.

"Historical Sketch,"[1] "In point of respectability, medicine undoubtedly stood lower than either the legal or theological professions.

"The religious difficulties in England had filled the ranks of the latter with men of learning, talents, and piety, while the offices of honor and emolument under the Crown offered allurements sufficiently powerful to induce many who were distinguished in law to emigrate to the western world. With medicine it was far otherwise: accordingly, for a long time, with some few exceptions, only those who had failed to attain respectability or employment at home would venture on so precarious an experiment.

"Nor were the young native physicians, for a long time, calculated to remedy the evil. There were neither lectures, schools, nor hospitals, which could be resorted to, and the expense of a foreign education was an insurmountable obstacle."

Even so late as 1753, we are told by the "Independent Reflector," a paper published in New York, that that city with ten thousand inhabitants could boast of more than forty gentlemen of the faculty, the greater part of whom were mere pretenders to a profession of which they were entirely ignorant, and convincing proofs of their incapacity were exemplified in their iniquitous practices.

The advertisements they published proved them ignorant of the very names of their drugs.[2]

It is estimated by Dr. Toner, in the "Annals of

[1] Historical Sketch of State of Medicine in America, p. 6. J. B. Beck, M.D.
[2] Davis on Medical Education, p. 16.

Medical Progress," that at the time of the Revolution the colonies contained about three millions of inhabitants, and from three thousand to thirty-five hundred physicians, of which number not more than four hundred had received a medical degree. The first course of anatomical lectures with demonstrations delivered in New England was given by Dr. John Warren, then surgeon of a military hospital in Boston, during the year 1780.[1]

Previous to the middle of the eighteenth century, obstetrics was not considered as belonging to the medical profession. All births were attended by females.

Dr. James Lloyd, returning from Europe in the year 1753, where he had been a pupil of the celebrated Smellie, first introduced the custom of attendance by male practitioners,[2] which afterwards became general.

Thus, without attempting to follow more fully the history of medicine in this country during the eighteenth century, we see that the only opportunity for a young man of moderate means to enter the medical profession was by associating himself with a local practitioner. This association was generally by apprenticeship for a term of years, usually five or six.

The apprentice was taken at an age much younger than we should now think a lad ready to commence the study of a profession.

Dr. John Bard,[3] when fourteen years of age,

[1] Davis on Medical Education, p. 46.
[2] Progress of Medical Science. Josiah Bartlett, M.D.
[3] Medical Biographies, p. 96. James Thacher, M.D.

was apprenticed to Mr. Kearsly, an English surgeon at Philadelphia, who treated him with great rigor, and subjected him to the most menial employments. Dr. Benjamin Rush was apprenticed at the age of fifteen; Dr. James Lloyd, at seventeen, for a period of five years; also Dr. Daniel Drake, while in his sixteenth year.

The apprentice was expected to perform the disagreeable duties about the barn and farm, as well as those more professional, such as the preparation of drugs, medicaments, and plasters, with occasional opportunities to assist at minor operations, and was dependent more upon his own observations than upon instruction received, for acquiring a knowledge of his profession.

Of books, there were but few, and these chiefly of the older writers,—Hippocrates, Galen, and Sydenham, with possibly some of the more recent works of Van Swieten, Huxham, Haller, Pott, Smellie and Hunter; but not often were more than three or four of these found in the possession of any one individual.

With this short prelude as to the status of medicine and the medical profession in the eighteenth century, I ask your attention to the subject of my paper—JAMES THACHER, M.D., of Plymouth, Massachusetts.

Dr. Thacher was descended from Anthony Thacher, who came to this country from England in the year 1635. He was born at Barnstable, Feb. 14, 1754. His father was John Thacher; his

mother was daughter of Samuel Norton, Esq., of Chilmark, Martha's Vineyard, and granddaughter of Gov. Coddington of Rhode Island.

With only such preparation as could be acquired while living upon one of the sandy farms of Cape Cod, he was, at the age of sixteen, apprenticed to Dr. Abner Hersey of Barnstable. That his preceptor was an eccentric and austere man, with less of the science than the art of medicine, appears from his student's interesting and somewhat amusing account of him.

Dr. Hersey's advantages of education were greatly deficient, he having labored with his father in husbandry during early life. He commenced the study of medicine under his brother James, of Barnstable, a physician of reputation and extensive practice. After a pupilage of about one year, his brother's death proffered him, at the age of nineteen, the benefit of that brother's name and the field of his professional labors.

At a youthful period of life, perhaps unexampled in the annals of medicine, and under the disadvantages of a penurious education, young Hersey began his career, and ever after pursued it with fidelity and zeal. He at once embraced the whole circle of practice which his brother had enjoyed, and it was not long before he acquired the confidence and respect of the people. For many years he commanded without a rival the whole practice upon Cape Cod, a distance of more than forty miles, containing a population of seven or eight thousand, controlling at pleasure his practice

and his fees. As a surgeon he was considered judicious and skilful, though he never performed a capital operation.

Dr. Hersey was subject to an hypochondriacal affection, and in his domestic character was eccentric in the extreme, a compound of caprice and whims. Domestic happiness and social intercourse were strangers in his family. He oftener chastened by his frown than cheered by an expression of approbation. He adopted a very abstemious mode of living, rejecting animal food, ardent spirits and wine, confining himself chiefly to a diet of vegetables and milk.

But in nothing was his singularity more conspicuous than in his manner of dress. His garments were of a fashion peculiar to himself, remarkably large and loose, and lined throughout with baize. Such was his whimsical fancy, that he had a great-coat made out of tanned leather. Seven calfskins were cut and formed into an outer garment, as a defence against the rain. He was by nature churlish in his temper, and abrupt in his manners; and when in his peevish moods it was common for him to express himself in such language as this: "I had rather be chained to a galley oar than suffer such vexation."

A curious instance of this kind occurred when the widow of his brother contemplated making him a visit. She informed him by letter of her intentions. The doctor, knowing that she would appear in a style rather different from that to which he had been accustomed, was greatly agi-

tated, and immediately answered the letter as follows: "Madam, I cannot have you. I have neither hay nor corn for your horses, I have no servants in my family, and I had rather be chained to a galley oar than wait upon you myself."

He died in the sixty-sixth year of his age, leaving no children. By his will he bequeathed to Harvard College five hundred pounds, as an additional endowment of the professorship to which his brother, Ezekiel Hersey, of Hingham, had previously given a larger sum.

Dr. Thacher completed his five years' apprenticeship in the twenty-first year of his age, at a most eventful period in the history of our country.

The battle of Bunker Hill had just been fought. All New England had become the theatre of civil war, and every member of the community was stirred with the deepest anxiety and patriotic enthusiasm. Our young doctor says of himself, "Participating in the glorious spirit of the times, and contemplating improvement in my professional pursuits, motives of patriotism and private interest prompted me to hazard my future in the conflict for independence."[1]

In taking this step, he met with no encouragement, either from his own family or from his late preceptor. All urged in opposition his youth, and the manifest hopelessness of the cause. However, his youthful ardor found in Joseph Otis, Esq., more sympathetic counsel. That patriot not only commended his purpose, but furnished him with a

[1] Military Journal, p. 25. James Thacher, M.D.

letter of introduction to his (Otis's) brother-in-law, James Warren, Esq., President of the Provincial Congress.

Through James Warren's influence his name was added to the list of candidates for examination; and he awaited the appointed day with anxiety and suspense, lest his stock of medical knowledge should be deemed inadequate, and his hopes be blasted.

That the examination was reasonably close and severe, covering the topics of Anatomy, Physiology, Surgery, and Medicine, is apparent, since, of the sixteen examined, six were privately rejected as unqualified.[1]

Having successfully passed this test, he was appointed surgeon's mate in the provincial hospital at Cambridge, Dr. John Warren being the senior surgeon. July 15, 1775, he assumed his duties. Dr. Josiah Bartlett was associated with him in a similar capacity.

This hospital consisted of several private but commodious houses appropriated for the purpose, and contained a number of soldiers wounded at Breed's Hill, as well as many sick of various diseases.

The following February, upon the appointment of Dr. John Morgan as Director-General of Hospitals, our young surgeon was subjected to another examination by that gentleman, and appointed mate to Surgeon David Townsend, and assigned to Colonel Asa Whitcomb's regiment, stationed upon Prospect Hill.

[1] Military Journal, p. 34.

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This regiment was one of the few which were permitted to enter the town of Boston, after it was evacuated by the British. At this time, small-pox prevailing, he was inoculated by his friend, Dr. John Homans, and passed successfully through the disease, not being ill in bed a single day.

He accompanied his regiment upon the expedition to Ticonderoga, and participated in that disastrous retreat, which afterwards proved to have been one of the factors in bringing about the ruin of Burgoyne's army by drawing that general into the interior.

The term of service of Whitcomb's regiment having expired, Dr. Thacher was appointed to the general hospital. While in this hospital, at Albany, he enjoyed fine opportunities for professional improvement, large numbers of officers and soldiers of both armies being assembled there. Among these was General Benedict Arnold, suffering from a fracture of the leg, whom the doctor found an exacting and unreasonable patient.

The following November, 1778, Dr. Thacher was appointed surgeon of the First Virginia Regiment, with which he remained until the next June, when, upon the invitation of Dr. Townsend, he exchanged into the First Massachusetts, commanded by Colonel Henry Jackson.

His relations with the Virginia officers had been most pleasant, but he believed it to be more advantageous to serve in a regiment with officers from his native state.

While with Colonel Jackson's regiment he par-

ticipated in various minor engagements and skirmishes, and was present at the execution of Major John André.[1] Of that melancholy sacrifice of a brave and chivalrous young officer to the stern and relentless rules of war, he has given us in his Military Journal one of the best accounts extant.

In July, 1781, Colonel Alexander Scammel, formerly Adjutant-General of the army, formed a select corps of light infantry, chosen from the most active and efficient of the New England soldiers. The honor of an appointment as surgeon to the troop was offered to Dr. Thacher, and accepted by him. This troop was intended for active and hazardous duty in advance of the main army. They were present at the siege of Yorktown, which terminated in the surrender of Lord Cornwallis. This incident of the war afforded Dr. Thacher the greatest satisfaction. He speaks of it as among the blessed privileges and richest incidents of his life, that he assisted at the siege and capture of a British army.

January 1, 1783, in accordance with a resolution of congress reducing the army in view of the near approach of peace, Dr. Thacher resigned his commission, and left his military service with honorable testimonials as to the faithful discharge of the various duties which had devolved upon him.

We have followed thus minutely his military career, as it was the school which liberally educated him. He entered the army an obscure lad of

[1] Military Journal, p. 272.

twenty-one years, poorly equipped with professional knowledge, and entirely deficient in worldly wisdom; he emerged after seven and a half years spent in the enjoyment of unusual facilities for advancement in his profession, an accomplished physician and surgeon. He had acquired also those social qualities which were not less important to his future success, by association as guest and friend with the most distinguished and cultured officers of the Revolutionary army.

He retired from the army July 1, 1783, and the following March established himself at Plymouth, Massachusetts, as a practitioner of medicine and surgery. The prestige which he brought with him speedily obtained for him a large and lucrative practice. His fame soon spread, and he was frequently called to the neighboring towns for consultation, especially in cases of surgery.

While pursuing an arduous and extensive practice, he was also engaged in teaching. Usually, as members of his family, were six or eight students whom he instructed by recitations and demonstrations.

In has been related to me by an old lady[1] who remembered the Doctor very well, that quite a serious local sensation was created by the suspicion that some of the dissecting material for his demonstrations was obtained from a neighboring church-yard. A curiously deformed individual was believed to have been resurrected by the students, and a mob collecting threatened the Doctor's

[1] Mrs. Mary W. Russell.

house, and interrupted for a time his course of instruction.

His labors as a teacher were no inconsiderable part of the good work which he performed for the advancement of his profession. Indeed such remarkable habits of industry and application had he, that he even was able among his other duties to take up medical authorship, and in this field he accomplished a work, which for its extent and value must challenge our respect and admiration.

His first publication was entitled, "The New Dispensatory, compiled from the most approved authors, both European and American," and was published in 1810. This volume he most courteously dedicated to his former preceptor, John Warren, M.D., Professor of Anatomy and Surgery in the University of Cambridge, and President of the Massachusetts Medical Society. Before publishing the work, he loyally submitted it to the Massachusetts Medical Society for its approbation. A committee consisting of Drs. John Warren, Aaron Dexter and Josiah Bartlett, after examination, commended it in the following terms: "As it appears to have been a principal object of Dr. Thacher to adapt the work to American Practice, and as he has adopted for the basis of his work the American Pharmacopœia of Massachusetts, lately published by the Medical Society and recommended for general use, they are of the opinion that it will coöperate with the views of the Society in that publication, especially as its nomenclature and order of arrangement seem to be strictly ob-

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served in the manuscript. They therefore conclude that it will be for the interest of medical science in this country to encourage the work; and it may be the means of exciting a more general attention to the medical virtues of American productions, many of which might be introduced into the Materia Medica, and advantageously as well as economically supply the places of foreign articles."[1] That these gentlemen did not err in their estimate of the book, or the need of the profession for such a work, is assured by the fact that it rapidly passed through four editions. The profession of the State showed an appreciation of it which must have been gratifying to its author.

Two years later he issued an octavo volume, entitled "Observations upon Hydrophobia." The style is that of a series of letters addressed to a friend, containing a very full description of the disease, the various theories and methods of cure existing at that time, and an inquiry as to the specific remedies which had been suggested, most of them secret remedies, acquiring great fame as infallible cures.

Among these last were the common red chickweed, tree-box and skull-cap, each celebrated. The most curious of all was known as "Crouse's Remedy," which was purchased from John M. Crouse, its inventor, by the New York legislature, in the year 1806.[2] The recipe, as filed in the comptroller's office of the State of New York, is

[1] Preface to new Dispensatory.
[2] Observations on Hydrophobia, p. 208.

as follows: 1st. Take one ounce of the jaw-bone of a dog burned and pulverized, or powdered to a fine dust. 2d. Take the false tongue of a newly foaled colt, let that also be dried and powdered. 3d. Take one scruple of the verdigris which is raised on the surface of old copper by lying in moist earth. The coppers of George I. or II. are the purest and best. Mix these ingredients together, and if the patient be an adult, let him take the common teaspoonful a day, and so in proportion for a child according to its age.

If these should fail, the patient should immediately apply to a physician, who will administer three drams of verdigris and one ounce of calomel at one dose, and he need not be alarmed on account of the size of the dose.

After enumerating, and pronouncing futile all the so-called remedies and plans of treatment which had then been suggested, Dr. Thacher in his final chapter expresses great hope in results to be obtained by properly conducted experiments upon animals, in some suitable institution, and concluding says: "You may smile at my project; but however chimerical and visionary it may appear, I would rejoice to be the Jenner of the proposed institution."

This language, in the light of the researches and discoveries of Pasteur, seems now to have been almost prophetic.

In 1817 he published a work on the theory and practice of medicine, entitled "American Modern Practice: or a simple method of prevention and

cure of disease, according to the latest improvements and discoveries; comprising a practical system adapted to the use of medical practitioners of the United States; to which is added an Appendix containing an account of many domestic remedies recently introduced into practice, and some approved formulæ applicable to the diseases of our climate." In his preface he says, "It is confessedly a matter of regret, that a country in which literature and science have been so honorably and successfully cultivated, should so long remain destitute of a systematic work on practical medicine."

The author most ably supplied this need, a second edition having been required a few years later. In the chapter upon the character, qualifications, and duties of a physician, the standard which he offers might well serve for the emulation of any generation. The entire literature of medicine furnishes no more complete or concise statement of the rules which should govern the conscientious physician who desires to do his full duty toward his clients and his fellow-practitioners. He says:

"The man who maintains this important station in society should possess the strictest integrity of character; disinterested benevolence and philanthropy should be interwoven in the constitution of his nature. He should possess that modesty and humanity which melts at every distress, extending the hand of relief and comfort to the afflicted, especially to the widow, to the father-

less, and to him that hath none to help him. He should be actuated by the dictates of tenderness and sympathy, which have their origin in the best feelings of the heart.

"To these meritorious qualities should be added an acute, penetrating genius, a retentive memory, intuitive discernment, and an intrepid and decided disposition of mind. To excel in the profession of medicine requires indefatigable industry, and a vast variety of liberal accomplishments, as well as an understanding improved by experience.

"The physician, on the commencement of his functions, should not allow his mind to be enslaved by systems, nor to imbibe a bigoted attachment to great names, as there is no absolute perfection in systems, nor infallibility in the wisdom of men. . . . He is not to be implicitly guided by the doctrines nor the practice of others, however eminent, but to establish a course of practice the result of knowledge, founded upon experience and observation. He will avoid all appearance of vanity and ostentation, exhibiting however a modest confidence in his own merits that may command the confidence of others.

"In his prescriptions he will endeavor to combine simplicity with elegance, rejecting the absurd idea that a combination of many simples in one prescription may retain and exert the separate virtues of each. . . . . He will confide in a few selected articles judiciously adapted, that the indications may be answered by as few medicines as possible. A superficial or cursory view of the patient, and a

slight examination of the symptoms, will never satisfy the inquisitive and intelligent physician, nor inspire confidence in his judgment and skill. The young practitioner will derive much benefit from a methodical record of all important cases that occur in his practice, describing with accuracy the disease, with the attendant symptoms and mode of treatment, whether successful or otherwise. Such record will furnish a document of much utility in facilitating his own improvement. It is to be recommended among the objects of peculiar importance to medical practitioners, to possess themselves of a well chosen library. If the pecuniary resources of individuals are insufficient to procure a competent collection of books, let district associations be formed to accomplish this purpose. A social medical library would prove a bond of union among physicians, besides rendering the acquisition of knowledge cheap and easy to its members. Those who voluntarily preclude themselves from the refined pleasure and satisfaction derivable from professional study, and practise only by rote, and drudge on in the same beaten track, although they may boast many years' experience, are but novices in many essential points, and utterly incompetent to discharge their calling with satisfaction to themselves or justice to their patients."[1]

No one can read even these brief extracts from Dr. Thacher's very full and complete article upon this subject without feeling that he was far in advance of his time in the exalted professional stand-

[1] Thacher's Modern Practice, Chapter X.

ard which he maintained, and in the high ideal which he urged,—an ideal which should stimulate the physician not only to elevate himself, but also to contribute something to the general advancement of the noble calling to which he belongs. Who can doubt that, entertaining such sentiments, he was the good physician, honored and beloved for his good works?

Dr. Thacher was at this time sixty-three years of age, and he was essentially a physician; the great work which he had accomplished as a practitioner, teacher and writer was confined to the field of medicine; but an imperfection of hearing, which he had had from youth, increasing with advancing years, compelled him to relinquish attendance upon his patients, and to find employment for his active mind in other pursuits.

A distinguished member of this Society, in his annual address,[1] quotes the remark: "Successful men may have gained much to retire *upon*, but nothing to retire *to*, if literature, social ties and philanthropic interests have been lost sight of, during the rush and struggle of their thirty years of active life"; but Dr. Thacher never having been engrossed in his profession to the exclusion of all other subjects, now found occupation and enjoyment in literature, in agriculture, and especially in horticulture. He contributed much to the development of this branch, stimulating it both by his example and his pen, as he not only planted and trained orchards himself, introducing new varieties

[1] Annual Address, Mass. Med. Society. R. M. Hodges, M D.

of fruit, but he wrote several papers upon the subject, and also a work entitled, "The American Orchardist," which passed through two editions.

In 1823 he published his "Military Journal, during the American Revolutionary War," which he dedicated, with sentiments of profound veneration for that patriotic warrior and statesman, to his Excellency John Brooks, Governor of Massachusetts. In this work we have one of the most graphic descriptions of the stirring scenes of the Revolution, faithfully portraying the hardships and struggles endured by those renowned patriots and heroes who risked life and fortune, everything but honor, in the cause of liberty.

Thacher's Journal is a continuous narrative of events of which the author was an eye-witness, extending through the whole struggle for national independence, a period of seven and one-half years, written in a style easy and attractive, with that added charm which always attends the narration of personal experiences.

Of all Dr. Thacher's works this is unquestionably the one which posterity has found the most valuable. Notwithstanding that it has passed through several editions, but few copies are now obtainable, and these are eagerly sought as rare prizes by those acquainted with their value.

The next year, after publishing his Military Journal, being then (1824) seventy-two years of age, he issued in two volumes of more than seven hundred pages, "The American Medical Biography; or Memoirs of Eminent Physicians

who have flourished in America," which he dedicated to Edward Augustus Holyoke, M.D., who at that time was in the one hundredth year of his age, the oldest physician in the United States, and the first President of the Massachusetts Medical Society. In the preface of this work he makes acknowledgment for valuable assistance received in its preparation from a number of his professional brethren, among them the father of our present venerable Dr. George C. Shattuck. This work will never lose its value as a book of reference for all who may wish to learn of the distinguished men who, from the time of the settlement of the country up to the date of issue, have advanced our profession. It contains a full and complete sketch of the lives of more than one hundred and sixty American physicians, most delightfully written, and honestly appreciative of the merits of each. A goodly number of portraits embellish the work, and help us to form an idea of those old worthies whom it commemorates.

An essay on "Ghosts, Demonology and Apparitions" and a "Practical Treatise upon the Management of Bees" followed soon after.

In 1832 he had become much interested in antiquarian research, and wrote the first history of the town of Plymouth. The first edition is said to have been burned while in the hands of the printer, and Dr. Dean, of Cambridge, believed that he possessed the only copy of this edition extant. In this volume he has collected the early records of the Pilgrims, and all events of interest from

the landing of the Pilgrim Fathers down to the time of publication, very faithfully. It was the first town history published in this State, and is valuable for reference even now. It is probable that Dr. Thacher was led to undertake the task from an interest inspired by his antiquarian researches in connection with the Pilgrim Society, of which he was one of the earliest members, and for many years librarian and custodian of its collection,—a position filled by him at the time of his death.

The records of the trustees of the Pilgrim Society contain the following resolve:

Resolved, That the members of this Society entertain a grateful sense of the eminent services of their late librarian, Dr. James Thacher, recently deceased, who by his zeal and perseverance in promoting the objects of the Society has well deserved that his memory be cherished with respect by all who feel an interest in its success.[1]

He was one of the earliest members of the Massachusetts Medical Society, for many years serving as councillor. Its objects and interests were ever dear to him, and he always expressed the greatest confidence in its continued success.

He was also honorary member of the medical societies of Rhode Island, Connecticut, New Hampshire and Georgia. He was elected a member of the American Academy of Arts and Sciences, of the New York Historical Society, and the Historical Society of New Hampshire, and foreign member of the Society of Statistics of Paris. He received the honorary degree of Doctor

[1] May 27, 1844, Records of Trustees, Pilgrim Society.

of Medicine from Harvard University, and also from Dartmouth College; also the degree of Master of Arts from Harvard University. He was one of the original members of the Society of Cincinnati.

As a physician, Dr. Thacher was versed in the science of medicine. He delighted in books, and made great use of them, but he did not draw his information from these alone. He had a very extensive acquaintance among eminent men in many branches of science, and maintained with them a correspondence most unusual in those days. In the practice of medicine he was not hampered by traditions and dogmas, but was ever progressive, constantly seeking new suggestions, and ever ready to try legitimately new plans of treatment. Sometimes his zeal for improvement in therapeutics caused his rivals unjustly to charge him with credulity, and too great haste in the adoption of new ideas.

Piety was a marked trait in his character; in all his writings he expresses the most profound respect for religion. He strictly and religiously regarded the Sabbath, refraining from all unnecessary professional labor upon that day, and was constant in his attendance at public worship.

All social reforms found an earnest advocate in him. Intemperance he especially denounced; and the smoking and chewing of tobacco he declared to be nauseous and disgusting habits.

Indicating his anti-slavery views, we may quote from his Military Journal an entry made in

October, 1781, while he was a young man, acting as surgeon of the Revolutionary army. "The labor on the Virginia plantations is performed altogether by a species of the human race, who have been cruelly wrested from their native country, and doomed to perpetual bondage, while their masters are manfully contending for freedom and the natural rights of man. Such is the inconsistency of human nature. Should Providence ordain that America should be emancipated from thraldom, it should in gratitude be our prayer that the African slave may be permitted to participate in the blessings of freedom."[1] This opinion he entertained and recorded, at a time when the right to hold human beings as slaves was unquestioned by even the most progressive and philanthropic.

As an author, Dr. Thacher is justly entitled to an honorable position. The number and variety of his subjects is astonishing. He was an indefatigable worker; thus he was able to accomplish so much literary work in addition to his strictly professional labors.

His style was conspicuous for completeness of research and clearness of description, with an ease and flexibility which rendered it attractive. The more we reflect, the greater will be our surprise that, without the early advantages of a liberal education, and accomplishing his work at a distance from the few medical centres and libraries then existing, and unassisted by the interchange of opinion furnished by medical journals and the

[1] Military Journal, p. 334.

stimulating association with those engaged in like pursuits, and removed from every kind of assistance in which city life is so rich and country life so poor,—privations, which every physician engaged in country practice must have often felt interfered with the fulfilment of his desires and aspirations,—that, notwithstanding all these disadvantages, his labors in the field of literature were eminently successful and the crowning glory of his life,—for his last work was published when he was over eighty-one years of age.

His was a life of great activity and industry, the venerable toiler not resting from his labors even at an age when repose from the cares and toils of life would seem to be imperatively demanded. His usefulness continued even to the end.

At ninety years of age he died, as the town record tells us, of old age, after a brief illness, upon May 23, 1844.

It is with great local pride that I have imperfectly traced the career of Dr. James Thacher, who resided for more that sixty years at Plymouth, believing that the name of this zealous patriot, good physician, faithful teacher, and able author, deserves an honorable position upon the roll of eminent members which is the glory and honor of this Society.

ARTICLE X.

THE SHATTUCK LECTURE.

NEURASTHENIA AND ITS MENTAL SYMPTOMS.

By EDWARD COWLES, M.D.
OF SOMERVILLE.

DELIVERED JUNE 9, 1891.

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SYNOPSIS.—Neurasthenia is one of the most frequent and important of nervous diseases, and its mental symptoms afford significant indications for diagnosis, prophylaxis and treatment. The history of the subject shows the early recognition of depression of feeling and weakened mental control, along with irritability, as signs of the characteristic nervous weakness. Insanity, in its functional and curable forms, is always weakness, and its study is useful in relation to neurasthenia, because they have a common ætiology.

The animal organism is biologically a mechanism, made up of minor parts or mechanisms. Physiological activity always tends to fatigue, which may be local or general. The study of neurasthenia, or pathological fatigue, presents two essential considerations:

1. In normal fatigue, with the discharge of energy, the toxic products of exercise are always formed in nerve and muscle tissues. From this and other sources toxic elements may accumulate in the blood and tissues; in pathological fatigue these contribute to a local or general inanition and auto-intoxication. Visible changes in nerve cells, attending normal fatigue, go to support the inference of a molecular and chemical variation, in pathological fatigue, manifested as a condition of exhausted or changed nutritional power. These changes bear a direct relation to the ætiology and pathology of neurasthenia; and habit, diathesis and idiosyncrasy have an important influence in causing "dispositions to repeat organic processes," both normal and abnormal. Physiological chemistry gives us some knowledge of the nature of autogenous toxic substance.

2. The study of the mental elements in normal and pathological fatigue shows that the mental symptoms furnish a ready index of the "fatigue":—(1) The emotional tone is either one of well-being or ill-being, and the latter, with mental depression, indicates changes in the "sense of body" or common sensations, due to deficient energy, inanition and auto-intoxication; (2) Special disorders of intellect and will are shown by a neurasthenic weakening of voluntary attention or the mental power of inhibitory control, and of memory, etc.

The analysis of normal and pathological fatigue shows that the mental symptoms of the latter may be readily recognized, that they correspond with the physical events in neurasthenia, and that all these phenomena, as far as they go, are in unity with the like conditions of melancholia.

The symptoms are objective and subjective,—mainly the latter,

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which include the mental symptoms. These fall by analysis into four distinct groups relating to (1) mental depression and a sense of ill-being, (2) diminished power of voluntary attention and mental control, (3) introspection and worry, with attention acting in its attracted form, and (4) changes in the "sense of body,"—irritability and hyperæsthesia, languor and anæsthesia. Two consequent conditions become prominent, and are of the highest clinical importance:—morning tire, and anæsthesia of the sense of fatigue. The summary of symptoms leads to a definition, including both the physical and mental elements, as expressions of the inanition and auto-intoxication of pathological fatigue, viz.:—*neurasthenia is a morbid condition of the nervous system, and its underlying characteristics are excessive weakness, and irritability or languor, with mental depression and weakened attention.*

The diagnosis is made clearer by an analysis of the mental symptoms, which are true and sensitive indices of the lower physical changes. This aids in prophylaxis. Neurasthenia may be regarded as the initial term of many nervous disorders having a varied ætiology.

The treatment with special reference to the objective symptoms, logically includes elimination, nutrition, rest, exercise, massage and promotion of sleep. The subjective, and especially the mental indications, being the earliest, and most significant from first to last, are the best guide to treatment; this must be suited to the two different stages of neurasthenia,—to the conditions of its *first-effects*, and its *after-effects*, and to different types of patients.

The plain philosophy of treatment is to recognize the mental symptoms as first showing the need of it, and to address it to the restoration of a healthy emotional tone as the central motive element; the lowering of this, and the weakening of attention and inhibitory control, are always the earliest signs of neurasthenia.

The maintenance of a normal sense of well-being is the sign of bodily health. Normal fatigue is simply wholesome tire; exercise should always be kept within the limits of *pathological* fatigue, in which the sensory over-tire, as fatigue-anæsthesia, marks the subtle beginning of danger. The natural safeguard is in the early recognition of the other mental effects of "fatigue."

These considerations go to prove the prime significance of the mental symptoms as a guide to the prophylaxis and treatment of neurasthenia.

NOTE.—This lecture will substantially form the third of a series of articles on "The Mechanism of Insanity" now being published in The American Journal of Insanity, and containing a more extended study of the mental elements also involved in this subject.

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NEURASTHENIA AND ITS MENTAL SYMPTOMS.

Mr. President and Fellows
of the Massachusetts Medical Society:—

The founder of the Shattuck Lectureship, whose memory is revered for his good works, and his loyalty to medicine and the welfare of this Commonwealth, has provided for special attention to the study of "diseases of its inhabitants," or "such other subjects" as this Society may select. Your Committee, in appointing me to the responsible duty of fulfilling its trust, has done me a great honor; I wish to express my high appreciation of it, and of the privilege of now addressing you. With the foregoing indications as to my subject I find that in New England there is probably no disease more prevalent than neurasthenia. It was the thesis of Beard,—to whom the world so largely owes the formulation of the accepted ideas of nervous exhaustion under the name given to it by him,—that it was mainly an "American disease." He believed that the chief and primary cause of its development and increase was "modern civilization," and that it had its "rise and growth" and highest expression, in the Northern and Eastern parts of our country. For the present occasion we may be permitted to accept these views so far as to find in them a reason for the fitness of this subject, as having a special local interest in this State of Massachusetts.

The subject of this lecture has been chosen with reference to its practical importance for the general physician, whose usefulness so largely and exceptionally lies in preventive medicine. My observations in the treatment of insanity

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have given me the conviction that in the commonly occurring and typical forms of mental disorder, which are of a functional and curable character, nervous exhaustion always plays an important part, both in the attending conditions and the causation. The treatment of these functional disorders, as far as the measures ordinarily regarded as therapeutic can go, is little else than the treatment of nervous exhaustion; this is the largest and most constant factor in producing the different groups of symptoms in disordered mental activity. Hence the practical usefulness of studying the varied manifestations of debility in nervous function, in its aspects prodromic to mental disturbance, both for the sake of cure of the existing disorder and for the prevention of the graver degree of exhaustion when insanity supervenes. Neurasthenia, according to Strümpell, is certainly one of the most frequent and important of nervous diseases.

History.—The subject to be discussed is neurasthenia, with special reference to the significance of its early mental symptoms as affording important indications for diagnosis and preventive treatment. When Beard, in 1868, described under the term neurasthenia a wide range of symptoms of "nervousness," or conditions of nervous exhaustion, he used the term as designating "a chronic functional disease of the nervous system, the basis of which is impoverishment of nervous tissue in excess of repair." When, in 1880 and 1881, he published in his latest works an elaboration of his well-known views, there had been a very general acceptance of the principles they involved; and subsequently many writers have classified neurasthenia as a neurosis, from its having no discoverable anatomical basis, and as signifying "nervous weakness." Beard's attempt to make of neurasthenia a distinct affection has however been much questioned. But by his originality and keenness of observation and analysis, he did his part in reducing a great array of data to definite principles, and initiating the wide

application that is now being made of them. In respect to their extension and particularly their relation to insanity, a statement here of the position held by the earlier writers will give the key to the present understanding of the subject.

The "deficiency of mental control," "inability to concentrate the intellect on any task," the rapid fatigue from "the exercise of concentration," the "mental irritability" and "hopelessness" were recognized by Beard as notable symptoms. He also observed the fact that "neurasthenia may concentrate itself almost exclusively on the brain—cerebrasthenia—with the symptoms of morbid fears and impulses, depression, insomnia, fulness, headache, impairment of memory, decline in mental force and power of control." But while making many such precise specifications of most characteristic symptoms of melancholia in its milder manifestations he would only admit that neurasthenia sometimes leads to insanity; and that, while many cases of nervous exhaustion, with irritability, great depression, etc., tending downward to melancholia, come to the border line, they do not cross it as a rule, though they may do so in extreme cases. Some cases of melancholia in our asylums, he says, have been neurasthenics, and some are saved from becoming insane; but he claimed neurasthenia to be a "distinct disease," not "exhibiting the enormous defect that is seen in insanity."

The universally accepted principles of the "rest treatment" that have become so well understood since Weir Mitchell's first recommendation of them, in 1875, in a regular and systematic scheme of treatment, need no discussion here. All are familiar with the classical description[1] of his cases of nervous exhaustion and his specification of the essential elements of the treatment:—seclusion, certain forms of diet, rest in bed, massage, and electricity. These

[1] Fat and Blood, 4th. Ed. 1885, pp. 38–43.

measures have stood the satisfactory test of experience by their use in proper cases, in promoting "a liberal gain in fat and blood," of which "the gradual increase will be a visible result of the multitudinous changes in digestive, assimilative, and secretive power in which the whole economy inevitably shares." The great importance of the mental element in neurasthenia, and the widening application of the principles and plan of treatment in mental disorders are in fulfilment of Mitchell's own prophetic words that its sphere of usefulness was likely to extend beyond the limits originally set by him. The bodily conditions in insanity were not fully recognized as so largely those of nervous exhaustion as they really are; and Mitchell, Goodell, Playfair and others have held like views on this point. Mitchell wrote, "The true melancholias, which are not merely depression of spirits from loss of all hope of relief, are best left alone as far as this treatment is concerned. The nutritive failures which so often accompany them must be met by other means than rest, seclusion, etc."; and this opinion was believed to be "sustained by some failures" on his part, and by the opinions of others.

It is interesting to note, however, how largely the plan of treatment was addressed to the mental condition of the patients:—the manner in which their confidence and cooperation was gained, and particularly the seclusion, were for their mental effect. The need to "rest the organs of mind" was noted, and that "it is thought with the friction of worry which injures, and unless we can secure an absence of this it is vain to hope for help by the method" described. It was Playfair's rule that the mode of treatment is "valueless without the cordial submissive assistance of the patient." But we have now been taught by experience the efficacy of these measures even when enforced, in the nervous exhaustion of melancholia and mania. All writers have observed, as did Mitchell, that "many neurasthenic people suffer from

any prolonged effort at attention,"—also the common loss of mental control. It is this characteristic lessening of the power of voluntary attention that becomes so significant in its diagnostic value, after we have observed its greater weakening in the graver exhaustion of melancholia. The common occurrence in the cases described of a brain hyperæsthesia as mental irritability, the depression of feeling, and despondency, are equally significant and characteristic of mental disorder from nervous weakness.

Hereditary and Acquired Neurasthenia.—The fact of hereditary predisposition was observed by all writers. Beard characterized it as a congenital weak resistance of the nervous system, entailing neurasthenia as a disease, or as constituting a nervous diathesis upon which the disease would be developed under deficient nutrition. But the idea of it as a clinical entity to be differentiated from other nervous and mental disorders has been broadened by some who regard neurasthenia as the primary condition of all nervous degeneracy,—not as itself a neurosis or a psychosis, but as the soil from which these may grow. There are two great groups of these affections, the hereditary and acquired. When inherited there may be organic modifications, permanent embryonic conditions, of the central nervous system as found in idiocy, etc., according to Arndt; or there may simply be a neuropathic predisposition with organic changes as yet undiscoverable,—a constitutional weakness and instability of the nervous system,—and this is hereditary neurasthenia. The form of acquired neurasthenia may occur in the constitutionally strong, and both forms may be due to any nutritional or toxic causes that can initiate a condition of weakness and irritability of the nervous tissue. Upon such a basis of organic and neurasthenic weakness, there may be engendered not only nervous disorders in general, but processes of degeneracy; and there may be like disorders and degeneracy in respect of those nervous functions

which we call mental. All diseases being considered not as "entities," but as morbid conditions and processes of which we observe the "symptoms," we may regard neurasthenia as a disease either hereditary or acquired, and as manifested by many mental symptoms.

General Relation to Insanity.—The statement has already been made that in certain forms of insanity the bodily conditions are essentially those of nervous exhaustion. Of the great number of people, who are in neurasthenic conditions, it is true to say that only a certain proportion become insane. But conversely, the proposition may be equally true, that all people of previously sound health and constitutions, who become insane with ordinary functional mental disorders, have their psychoses dependent upon neurasthenic conditions of the organism, whether the nervous power is annulled quickly by shock, or enfeebled more slowly by prolonged stress or other weakening influences. The fundamental condition here is acquired neurasthenia. When it is hereditary there is a plainer dependence thereon of mental symptoms that come more readily in such cases from stress, nutritive failure, etc. Insanity is always weakness from some cause or other, and the group of symptoms in any given case is a matter of the kind and degree of nervous exhaustion. We find the mental symptoms of neurasthenia in insanity, but being emphasized in unequal degrees in the latter condition, their import is more clearly revealed. Thus we may learn from the study of insanity how to understand and treat the lesser manifestations of nervous exhaustion in its earliest stages, as they are commonly seen by the general physician. In the study of the mental conditions having a common etiology, it will be of advantage if in either case the source and genesis of the symptoms can be made clearer. The present endeavor is to make such a contribution to the subject from observations of mental disorders dependent upon neurasthenia. It will

first be necessary to consider some of the fundamental principles that must be regarded in the analysis and interpretation of the data of clinical observations.

The Animal Organism a Mechanism.—The animal organism is regarded biologically as a mechanism which is stimulated to action by its environment, and in turn, acts upon it. Underlying all these phenomena is reflex action of the nervous system, and physiologists generally agree to consider every action as aroused by some definite cause or stimulus.[1] The mechanism, as a whole, is regarded as made up of minor mechanisms, when studied by the physiological method which reasons from structure to functional activity, and from activity back to structure. But the physiologist must observe many "activities" for which he can, as yet, only infer corresponding elementary parts in the organism, the relations of which he can only study as they are represented by their activities. This is peculiarly true of the mental mechanism and its activities, such as attention and memory. We have to assume that every manifestation of mind is correlated to a definite mode and sphere of brain activity; and we can conceive it as constituting a mental mechanism. We can conceive also all the systems and organs of the body as so many co-ordinated mechanisms,—as the muscular, circulatory, and digestive mechanism, etc. The nervous system as a mechanism, made up of many local adaptations to structure and function, presents a like variety of minor mechanisms, with peripheral aud central elements of co-ordinated ganglia, nerve-fibres, and nerve-endings. Any one of these minor nervous mechanisms may become neurasthenic from excessive or irregular exercise of its functional activity; the end-organs of the special senses, and any part of the peripheral or central sensory apparatus may become separately fatigued,—allowance being made for the resistance to fatigue of conducting nerve fibres.[2]

[1] Sedgwick. Art. Reflex Actions, Ref. Hand Book of Med Sciences.
[2] Bowditch. Jour. of Physiol., Vol. 6, p. 133.

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The same is true of the nervous elements of the motor mechanisms. All the inhibitory mechanisms, and particularly, in the sympathetic system, neurasthenic conditions of the inhibitory vaso-motor centres are especially important in the causation of both local and general disorders. The metabolic processes in general may suffer from central weakness of innervation and control; and there may be neurasthenia of such special organs as the heart, stomach, and liver. Thus there are many forms and degrees of the phenomena of nervous exhaustion classified under the divisions of cerebral, spinal, or general neurasthenia; and hence neurasthenia has been defined by Ziemssen[1] as "a functional weakness of the nervous system, varying from the slightest degree in single localities to entire loss of strength in the whole nervous system." But though the symptoms vary greatly according to the functions of the part affected, we are always led back to one principle:—the weakness of the nervous system from some cause, whatever it may be.

The physiological basis of these phenomena is the principle of the storage and discharge of energy of muscle and nerve. This accords with the biological theory that all function is due to chemical changes taking place within the organism, and that the functional activity of a specialized tissue depends primarily upon these changes in the individual cells. The fundamental idea is, that in the resting state the cell elaborates highly complex compounds, and that these break down to yield the energy by which the cell does its work.

Importance of Physiology and Chemistry.—Such being the character of the organic mechanism the difficulties have been very great in gaining an understanding of these affections. Writers have dwelt chiefly upon the facts, clinically observed, of the expenditure of nerve force and "the waste

[1] Neurasthenia. Wood's Monographs, Vol. 1, 1889, p. 534.

of nerve-tissue in excess of repair"; and emphasis has been laid mainly upon the nutritional elements of the problem. But while they have recognized the necessity of treating the mental conditions upon which they made clinical observations, the larger import of these mental symptoms has escaped full appreciation. Moreover, in the search for lesions explanatory of the most marked disturbances of function, anatomy and pathology are as yet disappointing. Physiology offers greater aid, and by the new laboratory methods not only bodily but mental activities may be studied, in advance of our knowledge of the structural mechanisms upon which they depend. Now newest of all, comes the science of bacteriology with its wonderful revelations, and the new discoveries in organic and physiological chemistry; they promise to throw great light upon these mysteries of our problem.

Two essential Considerations.—The present status of this problem gives us two important indications:—first, we cannot correctly conceive the existence of a condition that may be called "pure neurasthenia" as a matter of simple weakness from over-use, and inadequate rest and nutrition, but we must make large account of the presence of toxic materials in the tissues as the immediate products of this normal exercise;—and second, we must take into account also the nature and manner of production of the mental symptoms common to neurasthenia and insanity, and their significance and value must be better understood and appreciated. There is time here for only the briefest mention of some of the conclusions reached by the newer investigations in the different branches of this complicated problem; these may serve to indicate the grounds of the arguments in support of the two foregoing propositions.

1. *Toxic Elements in Normal and Pathological Fatigue.*—The normal organic mechanism, represented by a healthy adult, may be taken as a standard for observation.

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When it is stimulated to activity there may be observed the phenomena of use, and of stress from over exercise. Beginning with the peripheral muscular mechanism, physiology teaches us that fatigue is not the only result of muscular contraction. Noxious products are always yielded as the results of the attendant chemical change in the muscle-substance, by the decomposition of certain parts of which, the latent energy is set free and expended in mechanical work. The restoration to the normal state is not alone through rest, and processes of repair by nutrition and the rebuilding of the complex molecular substances of the muscular tissue, but the blood current carries off the immediate waste products, obstructive to function, while it brings new raw material.[1]

Normal Fatigue.—A muscle made to contract repeatedly, whether by electrical stimulation or voluntary effort, will yield regularly lessening contractions until it ceases to respond and is said to be "exhausted." In the case of voluntary contractions there is central fatigue also from the expenditure of energy in mental effort. The difficulty has been to distinguish between the central nervous fatigue, and the peripheral fatigue of muscles; but Mosso,[2] Maggiora,[3] Lombard,[4] and others have shown that the "curve of fatigue" is alike in each case. They have demonstrated experimentally in man, that there is an intimate connection between the fatigue of the central nervous system and that of the muscles,—that there is loss of power by exercise in both peripheral and central mechanisms,—and that the effects in each may be studied separately. When certain muscles were experimentally fatigued by long continued work under both electrical and voluntary stimuli, it was found that other muscles not exercised were also affected and their

[1] Foster. Physiology, 5th Eng. Ed. 1890, pp. 148–152.

[2] Arch. Ital. de Biol., 1890, pp. 123–186. [3] Ibid. pp. 187–241. See review of both articles Amer. Jour. Psychol., Vol. III. pp. 377–381.

[4] Amer. Jour. Psychol., Ibid. p. 24.

power lessened, as by a transmitted toxic influence. It was found also that human muscles have an excitability and energy peculiar to themselves, and that they weary independently of the excitability and energy of the nerve-centres. This shows that the muscles are the seat of certain phenomena of fatigue which, thus far, have been thought to arise in the central nervous system and to belong essentially to it. Under prolonged exercise there is lessened sensitiveness as well as diminished power.

In a man subjected to severe mental work, it was found that the muscles, which had been inactive, were weakened by it. The result of such experiments is regarded as going to show that a poisonous material, produced by chemical changes in the brain, enters the circulation, and, acting upon the muscles, weakens them. These demonstrations are also in accordance with the generally accepted physiological principle that the central nervous mechanisms, as do the muscular, undergo a regressive metabolism of tissue upon exercise, and that this is also of an oxidative character with toxic waste products.[1] There is also in nervous centres a like loss of normal excitability with fatigue and exhaustion.

Physiological Shrinkage and Recovery of Cell-contents.—A further demonstration of the physiological changes in nerve-cells is being made by Hodge,[2] in his experiments begun in 1887, which are of the most significant interest. The electrical stimulation, in frogs and cats, of a nerve going to a spinal ganglion caused, after a number of hours, a marked shrinkage of the nerve-cells, particularly of the nuclei, which lost forty per cent. of their bulk; the cells themselves, though decreased but little in size, showed extreme vacuolation in the cell protoplasm; and the nuclei of the cell capsule shrunk to a noticeable degree. The

[1] Foster. Op. cit., p. 154.
[2] Am. Jour. of Psychol., May, 1888; May, 1889, and Feb., 1891.

change in the cells was found to be generally in proportion to the severity and duration of their stimulation. It was shown that in a subsequent resting state the cells recover their normal appearance, but by a slow process. After five hours of severe work and a shrinkage of 48.8 per cent. in the nucleus, recovery required twenty-four hours. In the cells of a worked ganglion there are different degrees of shrinkage of the nuclei,—from 5 to 80 per cent. of original volume; in the latter the protoplasm was riddled with vacuoles and the nucleus shrunken to a densely staining speck. The spinal ganglia of pigeons and English sparrows, after normal exercise, showed exactly similar changes; —the difference between the condition of the sparrows' cells, when rested in the morning, and fatigued at night, being much more marked, on some occasions, than could be obtained by the most severe electrical stimulation. Sadowski has obtained the organic changes, of neurotic coagulation and vacuoles in central cells, from peripheral stimulation, mechanical and electrical. There can be no doubt that such visible changes are accompanied by chemical reactions also; the worked cells took the staining differently, and it is probable that new granules were formed taking a darker staining. The evidence is important, that all these changes are normal, and correspond with the daily rhythm of rest and activity,—sleep and waking.

These physiological and chemical explanations of the conditions following exercise, are supported by an evident diminution and removal of the substance of the nerve-cells as a normal process. It is shown that the actual expenditure of energy, muscular or nervous, is a factor which has always joined to it a toxic element in the products of the changes normally caused in the tissues by functional activity. There may be local areas of toxic influences hindering or inhibiting the functions of distinct peripheral or central mechanisms; and the blood becoming charged with them more general effects may be produced.

These are the common phenomena of a normal active life, in the daily round, from morning rest, vigor and alertness, to evening fatigue, weakness and heaviness,—both in mind and body. The restoration of normal conditions, with the re-storage of energy, comes through nutrition, furnishing new raw material,—rest, to stop the expenditure of energy and give time for the chemical building up of cell-contents, as well as for the removal of accumulated waste products,—and sleep, to hold in abeyance the general normal irritability, and afford effective repose to all tissues whose activities can be spared from the vegetative life. Unused muscle wastes; when used it grows. The nutrition of a muscle is favorably affected by its functional activity.[1] A wholesome degree of fatigue is normally attendant upon physiological use, through increased blood-supply and re-actions promotive of nutrition; this may be characterized as normal fatigue in contradistinction to the more pronounced effects which constitute exhaustion.

Pathological Fatigue.—In contrast with these normal processes may be placed the picture of the unbalanced conditions of waste and repair,—of expenditure and storage of energy,—the conditions of pathological fatigue, or neurasthenia. In a recent paper, valuable for its concise analysis of the subject, Dana[2] has given a comprehensive definition. He says, "Neurasthenia is a morbid condition of the nervous system whose underlying characteristics are excessive irritability and weakness"; it is "a condition in which the nutrition of the nerve-cells is primarily at fault." Can these phenomena be accounted for in default of anatomical and pathological findings?

It has been shown how inseparably normal fatigue from the discharge of tissue energy is accompanied by toxic products that increase the fatigue. Now every action of the

[1] Foster. Op. cit. p. 146.
[2] Art. Neurasthenia. The Post-Graduate, January, 1891.

mechanism is considered as aroused by some definite cause or stimulus. Stimulation too soon repeated, without giving time for rest and repair, finds nerve-cells in fatigued areas, having less power to act because of inanition from deficient rest and nourishment; they are also hindered in action by the incomplete removal of the toxic products of previous action,—in other words, there is inanition and auto-intoxication. Then further assimilation is hindered,—first by the lessened nutritive quality of the blood from non-eliminated toxic materials,—and second, by the probable toxic weakening of the cells' power to assimilate the nutrition that is furnished them. The development of a manifestly morbid condition may be very slow and insidious, or more rapid according as the balance of the processes of constructive and regressive metabolism is more or less on the side of weakness, exhaustion and impoverishment. In explaining the effect of this gradually failing elimination of the products of metamorphosis, acting as an irritating and exciting intoxication, Kowalewsky[1] says, "there will then be a condition of partial inanition of the exhausted portion of the central nervous system, while, in the same part, partial auto-intoxication is going on, and while the remainder of the organism is in its normal condition. The result of a partial inanition will be an increased excitability on the one side, and, on the other, a quick exhaustion of the nervous system; these are the constant characteristics of neurasthenia. Thus a locally limited over-strain of a certain part of the nervous system may lead to exhaustion and neurasthenia."

It has been easy to understand how the "nervous weakness" so essentially characteristic of neurasthenia, should be a logical result of "exhaustion" by over-use; here is not only further explanation of this, but the "excessive irritability" is accounted for; tissues, weak from partial inanition, and, under constant stimulation from toxic irri-

[1] Centralblatt f. Nerven heilkunde, October, 1890.

tation, almost excited into action, are over-sensitive upon the addition of ordinary stimuli. It is a kind of "hair trigger" sensitiveness that amounts to hyperæsthesia.

The localized neurasthenic conditions being acquired in this way in an organism previously healthy, it is easy to see how "entire loss of strength in the whole nervous system" may come about, through its prolonged exercise without due intervals of rest. In the excess of nervous activity and of the metabolic processes, there appears to arise from the decomposition or "combustion" of tissues, a condition of general inanition from inability of nerve-cells to take up the nutriment and oxygen presented to them in the circulation. Kowalewsky describes this as a demand for oxygen in the whole organism, or oxygen-hunger. This tends to increase, by deprivation, the partial and local inanition; and obviously the blood may be charged with an excess of the products of regressive metamorphosis, through inefficiency of the eliminative processes,—often because of weakened innervation. Then, he says, there is general auto-intoxication which adds its influence to the limited and local neurasthenic condition that may have been previously established. From this reasoning we derive four principal factors that, as pathological conditions, operate in presenting the phenomena of neurasthenia, and make up its clinical picture:—

1. Partial (local) inanition.
2. Partial (local) auto-intoxication.
3. General inanition.
4. General auto-intoxication.

This leads to the conclusion that, in very many cases certainly, neurasthenia has its foundation amply accounted for. The condition of inanition and auto-intoxication, whether partial or general, may vary according to the presence of one or more of the factors and their different values in the particular case. The auto-intoxication will

affect one mechanism, or organ, differently from another, according to the dissimilarity of structure and function; from different organs, or tissues, will come different kinds of toxic products, and their effect will vary also according to their amount. In anæmia, the general impoverishment of the blood, from its own diseases, will of course contribute to, and may initiate, both local and general neurasthenic conditions. Even when the blood supply is ample there may be locally limited over-strain and nervous exhaustion, probably due in part to the inability to assimilate nutrition. The conclusion of this matter is that, in morbid conditions, nervous weakness from inanition, due to expended energy and lack of nutrition of the nervous system, has always joined to it the varied effects of auto-intoxication as a dual cause of neurasthenia.

The Etiology of Neurasthenia,—Primary, Secondary and Hereditary.—The genesis of acquired neurasthenia in a healthy organism can thus probably be largely accounted for as a primary neurosis due to the immediate effects of over-strain, or a primary and toxic disorder of nutritional functions. The principle may be equally well applied to the secondary neurasthenias,—those consequent upon other diseases, each with its peculiar exhausting and toxic influences, as the essential feature of a general pathological diathesis. It is as yet impossible to say what the chemical action in cell-protoplasm may be that causes the increased excitability and quicker exhaustion of nerve tissue, when they are consequent upon the chronic auto-intoxication of rheumatic and gouty diathesis; but the transmission of these diatheses by heredity we cannot doubt, nor that children inherit neuropathic and neurasthenic predispositions from rheumatic and gouty parents. The same is true of all the "constitutional" diseases. The transmission of the effects of nervous diseases, alcoholism, syphilis, etc., may sometimes be shown in structural changes and

defects of the central nervous system,—sometimes, according to Arndt,[1] in permanent embryonic conditions from arrested development, but slightly demonstrable, and constituting the structural basis of hereditary neurasthenia. While this term may still be fittingly applied to those cases where there is only a predisposition to functional disturbances and disease of the nervous system, the close relationship of all these conditions to organic changes is apparent.

James Putnam,[2] in his study of the etiology of sclerosis of the spinal cord, notes the predisposition by neuropathic inheritance to degenerative change,—the suggestion, by some pathological findings, of a strain of constitutional or developmental weakness,—the general enfeeblement of the whole body through debilitating influences, as probably initial to a primary degeneration becoming relatively chronic,—the increasing importance assumed by toxic influences like syphilis, lead, arsenic, etc., and their conjunction with conditions of simple impairment of nutrition as contributive,—the influence of over-exertion with stimulation and sensory irritation inducing ganglionic exhaustion to a pathological degree,—and the possible relation of acute to chronic local anæmia.

According to Klebs,[3] also, the most essential characteristic of all degeneration is the deposit in the tissue of substance derived from nutritive changes in the part. There are disturbances of assimilation caused either by the deposition of non-assimilable material or by a diminution of the power of assimilation of the tissue; and the material may originate in the part or be brought to it from without. As an example of this, fatty degeneration is one of the most frequent and important pathological conditions which occurs in conjunction with the protoplasmic structures and the deterioration

[1] Die Neurasthenie, 1885, p. 110.
[2] Jour. of Nerv. and Ment. Diseases, Feb. 1891.
[3] Die Allgem. Pathol. II., pp. 54, 67 and 281, 286.

of their functions. General fatty degenerations always arise from influences which are either of an infectious or toxic nature.

As to the processes of pure, real atrophy, Klebs says, we have to deal with two fundamentally different sorts of disturbances of nutrition, according as the necessary food is withheld from the parts, or the power to assimilate it is lessened. In the central nervous system, the frequency and significance of circulatory disturbance depend on the easy disturbance of the nervous elements in consequence of the withdrawal of nutrition. The mental functions may be greatly disturbed by even simple anæmias if continued a certain length of time. Probably material changes in the composition of the blood may aid in affording the local anæmia the time necessary for bringing about the process of atrophy. In favor of this is the connection of many acute mental disturbances with infectious diseases, and their occurrence after typhus, puerperal fever, and acute articular rheumatism.

Pathology of Neurasthenia.—These pathological considerations indicate the effects that may follow from such initial causes as cerebral fatigue, toxic influences, lessened power of assimilation, local anæmias, etc., in the easily disturbed nervous elements. As the greater includes the less, we must regard the initial functional weakness and irritability of acquired neurasthenia, proceeding from the same causes, as their milder manifestations. Inasmuch as the "constitutional" taint or diathesis may be transmitted, we know not how, certain conditions in the individual may be regarded as consequent upon it and consistent with clinical observations. It is conceivable that the inheritance includes no more than "a molecular or chemical variation" in the central nervous system as the essential basis of the predisposition in hereditary neurasthenia. This implies "an exhausted or changed nutritional power"[1] and it may affect

[1] Kowalewsky, loc. cit.

any special system or organ, as the central nervous system, liver or kidneys.

The foregoing considerations lead to a more precise conception of neurasthenia as a pathological condition, which may be the outcome of normal activities of the organic mechanism simply carried to excess, and conceivable as a subtle, and perhaps but slight, departure from a normal state. The restoration of cell contents to a normal state, following the physical changes observed by Hodge in normal fatigue, might continuously fail of being quite complete; and the "molecular or chemical variation" would then become established as the condition of "exhausted or changed nutritional power."

Habit, Diathesis and Idiosyncrasy.—There are other considerations, relating to the effects observed as accompanying the physiological use of the bodily mechanism, that are of great importance here. They include as an active factor, constantly and profoundly influencing all the activities of the mechanism, the law of use and practice, constituting the law of habit; they also include diathesis and idiosyncrasy. These modifying factors, or conditions, are nearly allied and are not always discriminated.

In regard to the law of habit, the moment the organic mechanism is put in use the effect of the law may be observed. In the reflex action of the organism it is a familiar fact that nervous action tends to follow certain lines of conduction, along sensory and motor nerves, and through transforming centres traversed before under like conditions; this constitutes the "nervous circle," and suggests the analogy of "paths" in the nervous mechanism. The well known effect of practice in the muscular mechanism conforms to the law of use; and it must be taken for granted that analogous processes of practice take place everywhere in the nervous system and its accessory organs.

After any nervous action a changed condition remains by

which a repetition of the action is rendered easier, and in all processes dependent upon the nervous system there are after-effects which find their expression in what is called "practice."[1] According to Wundt, the molecular changes in which this practice consists being unknown, it still claims material after-effects, which continue at first, but with no practice gradually fall away, and do not consist in a continuation of the function itself, but in facilitating its repetition; the remaining molecular effects are to be thought of as functional dispositions. This functional disposition to repeat organic processes constitutes the law of habit.[2]

The disposition must then be considered as consisting in a tendency of cell-contents to repeat the physical and chemical changes that occurred before, upon a repetition of the given stimulation. Thus use and practice are fundamental to the law of habit, and the conception of the "path of practice" in the nervous system implies ultimately the disposition of cells and cell-contents to repeat their processes in such a way as to constitute a habit; and through the effect of habit, there come to be paths of least resistance for the discharge of energy of nerve-cells.

The law of sensory and motor habit, in the lower centres of the mechanism, has a strictly physiological basis, and the process is a physiological one by which these neural habits are acquired, from the beginnings with the labored first efforts to the facility of the most automatic of reflex actions. As already stated a nerve-cell, or group of cells, receiving an impression is modified in some way, and retains an aptitude or disposition for reacting again in the same way. This being true, the same law applies to all the co-ordinations of centres, as groups of cells, which acquire dispositions to act together; whatever be their functions, they become associated in action, and the law of association is an

[1] See Radestock, Habit, trans. pp. 15–16.

[2] For further discussion of this subject see my article, "The Mechanism of Insanity." Am. Jour. of Insanity, April, 1891, p. 475.

extension of the law of habit that governs all neural activities. There is abundant evidence of such physiological association, not only between neural and muscular activities but between these and mental processes. This is true whether these processes are simply physiological and normal, or pathological in their nature. The effects of the laws of habit and association are most significant as to the evidence that during the acute stages of nervous and mental disorders, accidental changes in the play of nutrition, exhaustion, and toxic inhibition, disturb the wonted channels of nervous activity, and the currents may be arrested or diverted into new created paths. Such variations of molecular activity acquired by habit, also tend to remain as "after-effects" when the causes have passed away. The readiness with which such morbid neural habits may be acquired, and how intimate are the relations of mind and body in their influence upon each other, have been well shown by Tuke,[1] and by Weir Mitchell's descriptions of the mimicry of disease.[2] Prince[3] has also shown how these laws of habit and association should be extended, in his study of "associated neuroses and psychoses," in hysteria, neurasthenia, etc.

For these reasons the consideration of the constant influence of these laws of use, practice, habit and association, should never be overlooked in the study of these disorders of physiological processes. The operation of these laws, when long continued, aids in inducing and perpetuating the changes, or "after-effects," which are conceived as something more than "dispositions" and not yet pathological, but as contributory and initial to such conditions and acting as "predispositions."

In normal conditions, native tendencies may become established in the individual, by "education" of the nervous system through the operation of these laws. These are

[1] Influence of the Mind upon the Body, 1884, 2d ed.
[2] Nervous Diseases, p. 50, et seq.
[3] Jour. Nerv. and Ment. Dis., May, 1891.

fundamental also to the theory of localization of cerebral functions, as the specialization of function of certain centres. The remarkable fact of the restitution of function after cortical injuries affords reason for believing that there is the formation of new paths in the remaining centres, by which they become "educated" to duties which they did not originally possess.[1]

The central and peripheral mechanisms are therefore to be regarded as alike having specific functions, both native and acquired, both being manifestations of the law of habit and the important principle that our nervous system, in its elementary parts, becomes educated to such specific functions. The study of the law of specific nerve energy, and its relations to the law of practice and habit, furnishes further important evidence, not only of the plastic and changing character of our organic mechanism when put in use, but of the fixedness given by habit to modes of action long in use, alike in health and disease. This reveals the potent influence of habit in all organic activities, whether physiological or pathological.

Native tendencies when acquired and established may come to be transmitted, appearing as a part of the hereditary endowment; then there is a significant analogy between them and the recognized morbid "predispositions" which must have been largely acquired through the same laws. It is well, therefore, in seeking for the pathology of neurasthenia, to take account of habit as an element both of neural conditions and predispositions. The force of habit tends to establish disordered activities by the direct operation of the law of practice in the irregular action. In the evil effects of "disuse," and the consequent loss of power, there is probably never complete disuse, and the effects of vicious and deficient practice are manifestations of the primary law of use. The recovery from chronic invalidism, through re-

[1] James. Psychology, Vol. I., pp. 24–30.

sumption of right practice, finds sometimes striking examples, as in "mind-cure," hypnotism, etc. These laws of use, practice, habit, and association in physiological processes, also help to an explanation of the clinical phenomena of apparent resistance to nutrition in confirmed neurasthenia. They cannot be ignored as contributive, and they are, perhaps, sometimes the sole cause of the underlying molecular variations in the nerve-cells, whose exhausted and changed nutritional power is thus maintained.

The relations of the diatheses to neurasthenia have been noted; great interest also attaches to the study of the more defined and limited tendencies known as idiosyncrasies,[1] which are innumerable in variety; everybody has them, and they are but rarely discriminated unless made prominent by their singularity and inconvenience. The well-known forms of idiosyncrasies against certain drugs, articles of food, poisons, etc., commonly regarded as constitutional and hereditary, are known to be sometimes suddenly acquired,[2] when there had been previous toleration, for example, in the use of chloral, quinine, tea, tobacco, etc. The changes in the organism induced by drug habits are of equal interest.

The relations of all these phenomena to molecular and chemical variations finds explanation in the newer views as to the physics and chemistry of cell activity. It is probably not too broad a conception of the law of habit to regard it as capable of inducing, in this way, and certainly as contributory to, both diatheses and idiosyncrasies. The views generally held of these conditions or results of activity lead us to regard them as representing tendencies to structural change. Habit, diathesis, and idiosyncrasy, may be characterized as principal elements of variation in the organic mechanism. In the direction of pathological change they describe conditions initial and antecedent to it, being them-

[1] See Hutchinson, Pedigree of Disease, 1884.

[2] Field. Art. Six Generic Drug Modifications. Boston Med. and Surg. Jour., June 26 and July 3, 1884.

selves not structurally demonstrable, except as to some congenital peculiarities classed as idiosyncrasies. Habit, though primarily normal, must, as a functional *disposition* to repeat organic processes, increase the persistency of the other two conditions. Diathesis is regarded as having always a pathological interpretation and as being a *proclivity*[1] to some peculiar type of disease; it is both hereditary and acquired, and carries the idea of persistency,—but it is curable, and having a toxic element conforms to the conception of a molecular and chemical variation. Idiosyncrasy is assumed to depend upon some structural change, usually hereditary and not always tending to disease. But being sometimes acquired, and often existing as a susceptibility to toxic influences, this implies again the occurrence of variations, of the character already mentioned, that may be initial to pathological change. And these implied variations serve to account for the manifestations of an exhausted or changed nutritional power.

While our present knowledge of the pathological conditions in neurasthenia is unsatisfactory, even with the most logical of inferences, we have to study, with all the more care, the recognized influences at work in the genesis of this nervous disorder. In the study of neurasthenia it is of special importance to note that such individual tendencies and idiosyncrasies may become emphasized with the lowered tone of the nervous system, and increased susceptibility to toxic influences.

Classification.—In its acquired form, in a previously healthy organism, it is a primary or a secondary neurosis,—primary when it is due to the immediate effects of nervous over-strain, or to a primary and toxic disorder of nutritional processes,—and secondary, when consequent upon other diseases having a general pathological diathesis with its peculiar exhausting and toxic influences. There is an acute

[1] Hutchinson, op. cit.

stage, in which the double elements of causation are always present: exhaustion with inanition, and toxicity. It is important to remember that the acute stage may continue for years with a series of exacerbations, under recurrences of the dual causes, and the tendency of nature to effect recovery, which may be finally established. In the chronic stage there has supervened the "molecular or chemical variation" manifested as "an exhausted or changed nutritional power" in nerve-cells,—a condition which may sometimes represent a partial recovery. There may be, in this stage, good blood, good muscles, a well-working mechanism, fairly good health, and physical comfort within lessened limits of nervous strength. The word chronic implies more than duration,—the transition is complete to the stage of permanent change, and the "constitutional predisposition" is fully acquired and established. It is this predisposition transmitted, which constitutes hereditary neurasthenia. In this condition all the forms may occur in all degrees of severity, and may be ameliorated by prophylaxis; it may even exist so quiescent and concealed that it appears to have acute and active manifestations followed by recovery.

Autogenous Toxic Substances.—In support of these conclusions, there would seem to be no unreasonable stretch of inference in such an analysis of the well-known facts of the autogenous production of toxic substances, and of their action in the causation of neurasthenia. Moreover, these facts, and much past conjecture, are now being reduced to scientific order by the discoveries that have established the principle of autogenous disease. It is shown that as the poisons of infectious disease are the chemical products of the action of bacteria upon organic matter, so there are like poisonous substances that regularly result from the chemica changes in non-infectious tissue-metabolism within the body. Just as ptomaines are noxious to the micro-organisms pro-

ducing them, so are the normal cells injured when the products of their own activity accumulate about them. The discovery, in some of these animal alkaloids (ptomaines and leucomaines), of the chemical poisons that have long been sought, is of special interest in the study of neurasthenia. Some of the substances, not alkaloids, formed in the alimentary canal in the processes of digestion, are powerful poisons,—the albumoses and peptones normally produced in the breaking up of the proteids in the food. As Vaughan[1] states it, in discussing the chemical factors in the causation of disease, "it matters not whether the proteid molecule be broken up by organized ferments (bacteria), or by the unorganized ferments of the digestive juices,—by the cells of the liver, or by those still unknown agencies which induce metabolic changes in all the tissues,—in all cases poisons may be formed. These poisons will differ in quality and quantity according to the force which acts." A number of observers have shown that the peptones may have an intensely toxic action, should they reach the general circulation unchanged.

Hare[2] explains the symptoms of biliousness as not depending upon the changes in the bile, but upon failure of proper digestion in the stomach and intestine, coupled with the development of irritative decomposition-products including a large number of poisonous alkaloids. Normally these do not form in the presence of the antiseptic bile which counteracts the action of the bacteria introduced with the food and is always to be found in the intestinal canal. The disorder of the hepatic function of destroying all poisons of an organic character permits the entrance into the general circulation of these substances, some of which act as do curare, digitalis, atropine, muscarine and picrotoxine; and the number of these compounds is indefinite. He suggests

[1] Jour. Am. Med. Assoc., May 16, 1891, p. 16.
[2] Practical Therapeutics, 1890, p. 357.

that when symptoms of such poisoning appear, relief may be afforded by the known antidotes for those drugs.

Brunton[1] describes some symptoms of dyspepsia, generally occurring about two hours after meals, as resembling curare-poisoning of the peripheral ends of the motor nerves. There are "muscular relaxation," "a curious weight in the legs and arms" which "feel heavy like lumps of lead." He says that the "melancholy and depression of spirits," associated with disorder of the liver, depend upon noxious substances passing into the general circulation because the liver fails to arrest them. He notes the "hypochondriasis and depression of spirits" associated with oxaluria, when "the patients complain of incapability of exerting themselves, the slightest exertion bringing on fatigue." Severer cases in the asylums have been described as the insanity of oxaluria. But Brunton says these symptoms may occur without oxaluria, and he conjectures the presence of some poison in the blood.

Halliburton[2] describes choline and neurine as ptomaines which may also be formed during life as leucomaines in the metabolic processes. Choline is of great importance as a type of these alkaloids, and neurine is closely related to it. Both act like curare on the end-plates. Muscarine, the alkaloid from poisonous mushrooms, is of the same class, and can be obtained also from choline by oxidation; it acts directly upon the muscular tissue itself. All these are powerful poisons, and are antagonistic to atropine in their special action on the heart and glandular system. Choline was first obtained by Strecker from bile, but choline and neurine are among the chief products of decomposition of lecithin. This important constituent of nervous tissue is found also in muscle, blood, and wherever cellular elements exist in the body; it is also in eggs, milk, cheese and other forms of food.

[1] Disorders of Digestion, 1886, pp. 42, 47.

[2] Chemical Physiol. and Pathol., 1891, pp. 178, 530.

In the changes of nitrogenous metabolism from nervous and muscular tissue through the complex series of transition-products to the end-products discharged as urea, uric acid, etc., these are notably augmented after excessive muscular work. There are a number of the intermediate substances which are credited with possessing an intensely poisonous action; this includes the familiar phenomena of the still undetermined uræmic poisoning. According to Gautier,[1] in the cycle of changes in the normal tissues of the body, there is constantly going on the formation of leucomaines and their subsequent destruction by oxidation before they have accumulated in sufficient quantity to produce poisonous effects. Hydrocyanic acid plays a very important part in the molecular structure of these bases. One of them, for example, xantho-creatine, studied by Gautier, is poisonous, producing in animals depression, somnolence, and extreme fatigue; and it appears in physiologically active muscles along with creatinine. Monari has found this base in the aqueous extract of the muscles of an exhausted dog, and also in the urine of soldiers tired by several hours walk.

The formation and excess of uric acid in the body, and its elimination, have been among the most thoroughly studied of all the toxic conditions. Whether it is due to an excessive formation in the liver, a defective excretion by the kidneys, or to some abnormal state of the nervous system, the many observers agree to its production of the marked symptoms noted by Murchison, among which are lassitude, headache, vertigo, insomnia, depression of spirits, irritability of temper, etc. Garrod ascribes its retention to failure of excretion; and Haig[2] has shown that, being formed by normal processes, its storage in the body, or excretion, are greatly influenced by the comparative alkalinity of the blood, which may be made to vary at will,

[1] Vaughan and Novy. Ptomaines and Leucomaines, 1888, p. 269.
[2] Uric Acid in Diseases of the Nervous System, Brain, 1891, p. 63.

within considerable limits, by the kind of food, the process of digestion, and the use of drugs. Thus the ingestion of acids, etc., reducing the alkalinity of the blood, and therefore its solvent power, causes the accumulation of uric acid in the tissues. The blood being freed of uric acid, there is diminished arterial tension, better cerebral nutrition, and sometimes a temporary sense of well-being and exaltation. This condition of the circulation is opposed to the elimination of uric acid, and favors storage and retention in the tissues, tending to later trouble. But in such cases, when from any cause there is increased alkalinity of the blood, the uric acid is more soluble, and its presence in the circulation produces the mental symptoms described.[1] Macfarlane[2] believes that the lessened alkalinity of the blood is the important cause of the disorders of sleep in the gouty, as being dependent primarily upon mal-nutrition of the cerebral cells, which renders them irritable snd responsive to faint impressions. Cells imperfectly deprived of their detritus do not appear to take up oxygen readily, and consequently they cannot be adequately nourished; they eventually assume a state allied to that met with in neurasthenia.

According to Haig, uric acid in the blood contracts the arterioles and capillaries all over the body, producing coldness of the surface and extremities, and the headache of migraine as a local, vascular effect of uric acid. With lesser effects there are mental depression, dulness, and inability for mental effort. Von Jaksch,[3] using the term uric-acidæmia, has recently found that uric acid accumulates in the blood not only in gout but in anæmic conditions, and considers that the cause of its appearance is defective oxidation. Many observers have attributed gout to the nervous

[1] Ibid. "Mental Depression and the Excretion of Uric Acid." Practitioner, Nov., 1888.

[2] Insomnia, 1890, pp. 234–236.

[3] See Halliburton, op. cit., p. 733–734; and Haig, loc. cit.

system. Sir James Paget has pointed out that gout mainly affects the sensory parts of the nervous system. These studies show, in respect to this one toxic influence, that its presence in the body, in other conditions as well as the gouty, bears an important relation to the disorders of the nervous, circulatory and nutritional processes,—and to that striking symptom of a sub-normal surface temperature which is persistent in some forms of neurasthenia; it also produces characteristic mental symptoms and disturbance of the sensory functions.[1]

The way in which repeated muscular contraction causes what is known as fatigue, is however very uncertain. In regard to the effect of the accumulation of products of combustion, the increased acidity of fatigued muscles has been noted by numerous observers since Ranke[2] pointed out the depressing effect on muscular irritability produced by all acids,—the carbonic and lactic among others, the muscle being alkaline in a state of rest. This excess of acid manifests itself subjectively by the sensation of fatigue, followed by sleep. The revival of exhausted muscles, upon renewal of the blood stream, is due probably both to the removal of the acids and other products of contraction, and to the fresh supply of oxygen,—the chief end-products of carbon and hydrogen metabolism being eliminated by several channels, expired air, sweat and urine. Mosso[3] considers that the poison which causes the symptoms of exhaustion is probably not carbonic acid, but a substance produced in small quantities of an alkaloid nature.

In regard to the results of exercise of nerve tissue, it is believed by some that fresh brain, cord, or nerve, has normally an alkaline reaction. All observers, however, agree on the most important fact, that acidity, whether present

[1] See a review of the subject of auto-intoxication, in an editorial article on "Fatigue as a Cause of Disease." Bost. Med. and Surg. Journal, June 28, 1888.

[2] See Halliburton, op. cit., p. 433.

[3] Report of Internat. Med. Congress, Berlin, 1890.

initially or not, increases on activity, and on death, and is probably due to lactic acid. This inevitably suggests a comparison between nerve and the closely related tissue, muscle. The only known chemical changes during activity of nerve tissue is the increase of acidity; the only known physical change is an electrical one, other than those shown by the demonstrations of Hodge. Some light may come, from such studies, upon the darkness of our knowledge with regard to the essential molecular changes that attend nervous activity. In the chemical reactions the great importance of a healthy blood-supply is noteworthy here; the deprivation of the oxygen it affords means an abolition of all the higher cerebral functions, such as consciousness and volition.[1]

There can be little doubt that certain febrile conditions are autogenous; they may be due to excessive formation of poisons in the body, or an accumulation of these through deficient elimination. Bouchard has shown that the urine excreted during the hours of activity is much more toxic than that excreted during the hours of rest. Both physical and mental labor are accompanied by the formation of the poisonous substances which will accumulate if the hours of labor are prolonged and those of rest shortened.[2] As a result of deficient elimination, "fatigue fever" is not uncommon in its milder forms, with its symptoms of impaired appetite, mental and physical "irritability," restlessness, insomnia or fitful and unrefreshing sleep, and an excited brain that will not rest. In a severer degree this self-produced condition is the "fever of exhaustion"; and this leads up to the deadly typhus which is the highest expression of the poisoning of the organism by itself or by contact with others under like conditions.[3]

The general truth of this matter is well summed up by

[1] Halliburton, op. cit., pp. 515, 516.
[2] See Vaughan and Novy, op. cit., p. 293.
[3] See Aitken, The Animal Alkaloids, 2d Ed. 1889, p. 28.

Aitken[1] when he says that "the healthy living organism may become poisoned (gradually and more or less slowly) by the accumulation within its self of deleterious substances normally elaborated. Hence the slow and insidious onset of much ill-health; and from which recovery is correspondingly slow." The few examples cited serve to show the nature of the evidence, and that we have constantly to deal with definite toxic influences in the processes of nutrition and the discharge of energy in the organic mechanism. It is true that we have as yet little precise knowledge of these toxic substances, and of their effects upon the nervous system. Many of those obtained are probably formed by the action of the reagents used in the analysis, when their existence in a free state, in healthy tissue, is very doubtful. But though the science is yet in its infancy, we know enough to recognize the immense clinical importance of studying the chemical elements whose positive influence in the production of nervous symptoms must now stand as an unquestioned fact. It must be remembered also that we are still compelled to study functional "activities," and disordered conditions of which we can find no trace in the organism.

The study of the general organic mechanism, so far, shows that it may be conceived as made up of many minor mechanisms which may be studied as represented by their activities. Some general truths have been reached in regard to all of them as to their structure, their co-ordinations, and the results of their functional exercise. These conclusions are in support of my first proposition, to the effect that, when the mechanism is put into use, physiological activity and toxicity always occur together, and that the condition thus jointly produced has its first expression in normal fatigue. Moreover it appears that in pathological fatigue or nervous exhaustion, which constitutes

[1] The Animal Alkaloids, 2d Ed., p. 20.

neurasthenia, there results from excessive use and inanition, a condition of "excessive irritability and weakness" of the nervous system. There is also, in acute neurasthenia, always an increased toxicity, by its accumulation in fatigued areas, and often by general fatigue and auto-intoxication through disordered nutritional processes.

2. *Mental Elements in Normal and Pathological Fatigue.*—It is next in order to make a practical application of general truths more precisely to the nervous and mental mechanisms, and their special disorders in neurasthenia. This leads to my second proposition, that to properly study our problem we must take into account the nature and manner of production of the mental symptoms common to nervous exhaustion and insanity. This brings out the main purpose of this study of the relations between mind and body:—to show how it is that the mental symptoms furnish a ready index of the fatigue and auto-intoxication of nerve and muscle tissues, as a guide for diagnosis, prophylaxis, and treatment; and also to show how the general symptoms of nervous exhaustion can be better understood by a proper interpretation of the mental symptoms. The acute, acquired form of neurasthenia will therefore be first considered with reference to the mental symptoms, to show what they are, and how they are produced.

All observers agree that the symptoms of neurasthenia are largely subjective. There are objective signs, but the physician mainly depends upon the patient himself to tell how he feels. Every physician also learns to qualify such statements according to his estimate of the individual and his mental state, under the bias of the characteristic "hopelessness" and "worry," or even of the less intense "depression of feeling." These symptoms pertain to the state of the feelings, and constitute the emotional tone, in its intimate dependence upon bodily states which afford a general sense of comfort or discomfort,—of well-being or ill-being,

more or less persistent. This is quite independent of the intellect, and the passing feelings which are normally attendant upon pleasing or painful ideas. These disorders of the feelings and the emotional state constitute one distinct group of mental symptoms.

All the writers on this subject have also given prominence to the striking clinical manifestations of "inability to concentrate the mind,"—the weakening of the power of attention. Here is another important group of symptoms that represent disorders of the intellectual activities and the voluntary power. The most prominent of these, as a sensitive index of nervous fatigue and exhaustion, is the attention.

The Primary Data of Mental Activity,—two groups.—All these mental activities have to deal with sensations as furnishing the primary data of their operations. There are two groups also of these sensations:—the first are the general organic sensations, not intense enough ordinarily to pass over the threshold of consciousness, but they constitute the vast subconscious inflow of minor sensations through all the sensory channels that lead to the sensorium from every tissue and organ, and from every peripheral mechanism, nervous or muscular, in the body; the second are those we are conscious of as presented through the special senses and that stand in the mind as perceptions, ideas and memories;—these are the data of consciousness. The great complexity of this matter can be made intelligible by taking a little time and patience to grasp some general principles, and to reduce the complex elements to an orderly arrangement in our conception of the mental mechanism.

(1). *Organic Sensations and the Emotional Tone.*—The organic sensations in the subconscious mechanism, demand first consideration as best revealing something of the mystery in the relations between mind and body, and the genesis of the mental symptoms in neurasthenia. These

sensations, proceeding from all the states of the body, are in some degree and form represented in the sensorium. They constitute the sense of body,—the sense of personality.[1] The line cannot be strictly drawn between the conscious and the subconscious activities, as to these organic sensations. Many of the sensations received through the special senses and giving knowledge of the outer world, enter a passive consciousness, as the ticking of a clock that is not consciously perceived unless it stops, or attention is turned to it. There are still weaker sensations, coming through the special senses, of which we are not conscious. In like manner, but in reverse order, the great mass of the organic sensations are normally unperceived, but some of them may be intensified enough, as by some disorder, to enter the field of consciousness. Those arising from the trophic, and minor inhibitory mechanisms, are among the most subtle and unfelt, as are those from vaso-motor changes in the general and local circulation which are most important in their influence upon mental states. But even among these, the inner tingling sensations, followed by general chilliness and external pallor upon a sudden idea of great danger, are probably due to the swift vaso-motor constriction. There are also the normally unperceived, though incessantly repeated sensations, which provoke and accompany the respiratory movements. They may arise also from the state of the muscles after exercise, even when inactive, giving the feeling of fatigue and exhaustion; or in an opposite condition may afford a general sense of vigor. The muscular sense is a stronger representation of the organic sensations that are sometimes classed with the special senses. Hunger and thirst are not localized sensations, but result from a discomfort of the whole organism, being connected with the state of nutrition.[2]

[1] Ribot. The Diseases of Personality, trans. Chicago, 1891.
[2] Bain. "The Senses and the Intellect," 3d Ed., 1888, Part II.

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Sense of Well-being.—These normally latent or obscure sensations, low in intensity but great in volume, are persistently flowing inward beneath the fewer but relatively intense and transient sensations from the special senses. In the healthy organism, refreshed and vigorous, there is an equilibrium of physical sensations, or a multitude of agreeable feelings attendant upon the exercise of normal power. This physical state produces a mental sense of well-being; the persistence of this will give its special character to the physical and mental habitude, or the personality of the individual.

Sense of Ill-being.—But in the conditions, represented by a sense of ill-being, there are feelings of fatigue, depression, anxiety, languor, absence of desires, a sense of lack of power, of self-depreciation, and of personal unworthiness, etc., of which the patient gives account. Beard has well characterized this "as an instinctive consciousness of inadequacy for the task set before us." "We are hopeless," he says, "because our nerve force is so reduced";—"a certain amount of nerve strength is necessary to supply the courage requisite for simple existence." The persistency of these feelings is marked by a visible change of personality. In slighter degrees these changes are like those commonly seen in the evening tire of an active man, from which restoration follows. When, however, in the processes of waste and repair, the balance turns slowly and insidiously to the side of weakness of nervous tissues, whose corresponding mental activities show these symptoms of disability, they stand as evidences of a neurasthenic condition. As these morbid physical states persist, the ideas suggested by the morbid feelings, and to account for them, are framed by degrees into some wrong conception. Although there are, however, many cases of melancholia without delusions, yet beliefs may be engendered consistent with the morbid state of hopelessness, self-reproach, and worry. In many cases

special delusions are formed for which the patient gives reasons, with a degree of intellectual integrity that is peculiar to melancholia. These allied organic and consequent mental changes profoundly modify the personality in its inmost nature. By the process described this is not the violent and superficial effect of sudden emotions, but results from a slow and subtle process that irresistibly changes the basis of the personality. It is easy to see how such morbid organic sensations may be engendered in a general neurasthenia and produce such a train of nervous symptoms, characterized by a sense of ill-being, depression and hopelessness. Like results may come from nervous exhaustion initiated in the brain itself, by mental overwork, care and anxiety. Here is the bond between well-being and ill-being of body and the emotional tone. It is plain how the changing states of mental feeling reflect the bodily states in the alterations of the sense of personality.

Mental Symptoms of Auto-intoxication.—The new evidence in regard to the toxic elements engendered in the body sustains these views, and seems to offer the long sought explanation of many obscure conditions. Full force should be given to the fact that in all forms of functional activity the fatigue proper, from the discharge of energy and the breaking down of material cell contents, has always joined with it the toxic influence of self-produced waste products. We are able to account for much that appears confusing in the symptoms of fatigue, by ascribing their variations to differences in the kind and quantity of the specific poisons that are developed in the various tissues. For example, while melancholia is generally characterized by a disposition to quietude and shrinking into seclusion, some cases are marked by great mental agitation and physical restlessness, the essential physical and mental condition being the same. A fair inference is that there is an irritating intoxication in such cases. But again there is the peculiar condition of

apparent stupor added to the ordinary melancholia, so that in extreme cases the patient cannot move his limbs or utter a word, and the facial expression is blank. This presents a more profound degree of the condition described by Brunton as like the poisoning by curare of the muscular mechanism. The absence of true psychic stupor in many such cases is well proven. It has been seen that these symptoms may be produced by choline, neurine, and muscarine, which are antagonistic to atropine. In Hare's suggestion that it is possible to give relief by antagonistic remedies when there are signs of auto-poisoning, he mentions dilated pupils, a hot and dry skin, dim eyesight, rapid pulse, as like the effects of atropine. Symptoms resembling them in lesser degree are seen in both neurasthenia and melancholia. Again a slow and full pulse with high arterial tension, and a throbbing frontal headache, suggests the ptomaine like digitalin. Some of these poisonous substances lower the temperature; it is often sub-normal in the graver neurasthenic conditions. Upon the basis of such causes, and such a method of production, the "excessive irritability and weakness" of neurasthenia seem amply accounted for. By means of local perversions, the weaker organic sensations sometimes come to be felt, and may be so intensified as to bring them into the group of those that are consciously perceived and localized. Languor, dulness, stupor and lethargy are like manifestations of toxic influences. These altered sensations will be hereafter described. They are of great psychological importance. Reference has already been made to the relation of uric acid to diseases of the nervous system, and the characteristic symptoms of lassitude, depression of spirits, etc. Its formation, elimination, and possible excess in the blood, are so essentially connected with the processes of waste and repair as to make these symptoms most significant in their relation to neurasthenia.

The conditions of mental feeling, marked by the emotional

tone, as states of well- or ill-being, have now been shown to be intimately bound up with the great volume of subconscious bodily feelings, and representative of their predominating quality. They are normally so low in intensity as to be undiscriminated; but when intensified by morbid conditions they become symptoms of the existing disorder.

(2). *Sensations from the Special Senses;—Perceptions, Ideas, etc., and Disorders of Intellect and Will.*—It now remains to consider the other group of symptoms representing disorders of the intellect and volition as distinguished from mental or physical feeling. Of these disorders the most important indications pertain to the attention. All writers on neurasthenia have noted the fact that the mental symptoms of the higher order are always prominent. But what is wanted is a sufficient analysis of them to show their twofold significance. A brief explanation should make this clear, and easy to understand, as it is necessary to be known. On the one hand the disorder may begin below in the sources of organic sensations, and extend upward into the higher mental sphere. The great mass of sensations beneath are summed up into our sense of physical personality. Compared with them, all that comes into our conscious minds through the special senses, and the succeeding perceptions, ideas, memories, judgments, feelings and volitions, in the "circuit of consciousness," represents a small item. In acute neurasthenia, and true melancholia and mania, there is always nutritional, toxic and functional weakness, fundamentally, in the organism; it is from this that the influences arise which affect our conscious feeling and thinking, making these higher mental states the sensitive indices of the lower physical changes. For like reasons these subconscious changes of personality, pervading and voluminous, have a predominating influence. When all goes well with the organism, and it is in a condition of unfelt equilibrium, the processes of thinking and feeling are adjusted,

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more or less logically, to the varying environment, upon a basis of a sense of well-being and normal love of life. On the other hand, a morbid process may be started in these higher activities, in a previously healthy and strong organism; but until the organism itself suffers a change to the specified nutritional and functional weakness, there can be no such mental symptoms as are being studied here. Normal mental activities cannot produce "mental symptoms" except by first causing the characteristic "weakness" somewhere in the physical basis of them all.

Familiar Facts of Mental Manifestations. Consciousness.—There is no need, in this matter, of entering into psychological speculation. It is only necessary to consider the final facts of the manifestations of mind with which we are most familiar. We commonly note the fact of consciousness for example, and distinguish between such states as its absence in coma, its partial presence in sleep, or its full activity in an alert and intelligent mind when we cannot doubt that some activity of organic elements is added which was not present in the less active states,—as of coma, for example. We use many phrases to describe different degrees of this activity, meaning always a state of consciousness the sum total of all its activities.

The Attention.—The attention is the term applied to denote the mental action when a particular object of thought is held in mind to the exclusion of others. Active consciousness is always attending to some one presentation in its field,—this action is attention, and this activity is always going on in connection with every other mental action, or object of thought. The mind may attend to the presented perception of a new sensation,—a re-presentation in memory,—an abstract conception,—or the idea of a muscular movement. The larger importance of the attention is due to the fact that in it resides the inhibitory power over all mental operations. The attention is to these what the

physiological principle of inhibition is to the lower nervous mechanisms. It is the abatement of this higher inhibitory power, and of its regulating and guiding control, that appears early and most constantly in mental fatigue and weakness. This is manifested by changes in the power of attention.

Ribot[1] has made very clear, by a simple analysis, the office of the attention. It acts in two forms:—voluntary attention is its acquired form gained as a result of the higher evolution of man;—spontaneous attention is its natural or primary form, when its action is attracted or reflex, as is so manifest in children and animals.

Spontaneous Attention.—Spontaneous attention being first considered, the essential fact is that it is always attracted to the object or idea in the mind that most interests it, or keeps it on the alert. This idea may be intensified in interest by pleasurable or painful feeling,—by a desire or a fear. Now it has been shown that when the emotional tone represents physical well-being or ill-being, ideas harmonious with the emotional tone will be intensified. It has been shown also that in states of ill-being and depression the attention is persistently attracted by painful ideas which are thereby further intensified. Thus a state of habitual mental pain shows attention attracted by, and dwelling upon, painful ideas. This is the basis of worry, and it is thus shown how worry intensifies its own cause. The clinical significance of worry, therefore, is that the weakened attention is being occupied by painful ideas which are intensified by the exaggerated influence of a painful emotional tone representing a weakened and irritated physical basis. The painful ideas are further intensified by the concentration upon them of the attracted attention. When only attracted attention is in action, as in extreme conditions, the spontaneous flow of ideas goes through

[1] The Psychology of the Attention, trans., Chicago, 1890.

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the mind in a wandering train, as in dreaming or delirium, without check or guidance; and those ideas in the train most attract the attention which are then in harmony with the emotional tone.

Voluntary Attention.—The exact antithesis of this is voluntary attention. As to this, the essential fact is, that it is the activity of inhibition. The attention directed and concentrated upon a chosen object of thought is an act of volition. A man controls his own mind by willing his attention, as it were, to be fixed upon some one item or object, in the train of presented ideas, to the exclusion of others. He thinks about what he chooses to think about; he may make the most worthy object the most interesting; by dwelling upon its worthiness he intensifies it, thus resisting the attraction of less worthy interests and emotions. This directing of the attention by the will may control and guide the processes of thinking,—may inhibit the promptings of the emotions in conduct; and it does manifest itself in all voluntary action. Attention has always a motor element and expresses itself in muscular movement. In a healthy man, with a refreshed and vigorous organism, and a trained intelligence and attention, is found the most efficient expression of this higher power of inhibitory and guiding control. This is an acquired power, improved by training. Now it is plain to see the importance of the clinical signs in regard to the higher inhibition. Let there be weakening of nervous energy from any cause, then the weakening of the voluntary attention is a direct and immediate sign of mental and general tire or exhaustion. It may be that, in such a state, as much or more "control" is exercised, but it requires more effort and expenditure of nervous energy.

The more the higher control power is lessened, the more the spontaneous attention is left free to act. The gradual reduction of the control power of the voluntary attention is

matter of common clinical observation in normal fatigue, neurasthenia, melancholia, etc. Here then is further shown the bond that extends between the changes in the physical basis of the personality and the changes in the higher power of attention which thus becomes a sensitive index of bodily conditions. The mental attitude at any given moment is determined by the state of the attention. This is always tending to act in a reflex and spontaneous manner according to the emotional tone, as attracted by the most interesting ideas. When bodily feeling is in equilibrium the voluntary direction of the attention is easiest; but direction is always inhibition,—by will and choice the ideas are held in view that stir the worthiest feelings, or a consenting will yields to those made interesting by desire. Then feelings as motives add intensification to the mental attitude, and again we find the potent influence of the emotional tone. It controls or is controlled. This brings out the practical point that is of present interest,—the need of the higher inhibitory control and what it works against. According to Foster, just as physiological inhibition plays its part in the lower mechanisms, so is it important in the whole work of the central nervous system. He says,[1] "In all probability many of the phenomena of nervous life are the outcome of a contest between what we call inhibitory, and exciting or augmenting forces."

Another practical point is of the greatest importance here in regard to the higher inhibitory control, acting through voluntary attention. It is the application of the principles in the laws of practice, habit, and association. The mental activities do not escape the full force of these laws. When once a mental attitude has been determined by the interplay of ideas, feelings, and controlling or consenting will, there is a functional disposition to repeat the organic and attendant psychical processes. "Habits of thought" are

[1] Op. cit., p. 918.

acquired, and they are characterized either by a habit of yielding to impulsive emotion, or as determined by a controlling inhibition. The principle of practice is in like manner always ready to reinforce the power of voluntary attention. Hence we see that the attention, as the agent of the will, has to work against also the effects of practice and habit which tend to become fixed by states of feeling, the associations of which with ideas are also strengthened by habit; while at the same time, voluntary attention trained by practice leads to the highest acquirements of mental power. Conversely, we see the import of the lessening of inhibitory, selecting, and directing power in states of nervous fatigue and exhaustion. Whatever the physician may discover in the bodily condition of his neurasthenic patient, or whatever he may infer of its pathology, he should always remember the effects of habit in the mental activities. The nervous invalid may remain such, even under strongly recuperative tendencies, simply from mental habit, confirming it both by misuse and disuse of normal power. The patient, powerless to contend alone against the forces of weakness and habit, must have a physician for both mind and body.

Mental Symptoms in Normal Fatigue.—The fatigue of the attention will vary in its manifestations in different degrees of nervous fatigue and exhaustion. Its predominating significance is also shown by its relation to mental symptoms which may be sufficiently illustrated by a not uncommon experience. Suppose that after a day's professional labor you have spent a long evening at your desk. Your probable mental condition may then be as follows:—There is lessened mental activity. Voluntary attention is fatigued, and in spite of much effort you repeatedly find your spontaneous attention attracted along some train of ideas to a subject remote from the one you are trying to keep in mind. Sense-perception is less acute,—the atten-

tion shows fatigue by inattention to incoming sensations. There is less power of memory,—it is less retentive, because diminished attention to impressions renders them less vivid,—its recalling power is slower and weaker,—and in the underlying association of ideas there is a spontaneous flow which is controlled only by unusual effort of will,—the association process is itself slower, the vocabulary diminishes, and even familiar names and words may not be recalled. The logical processes work more slowly in making comparisons and judgments, and in reasoning to conclusions,—the tired attention with effort holds on to one member of a proposition while another slips away. With growing torpor your attention may cease to be stimulated and you may fall asleep. There is a lowering of the emotional tone and a quietude of feeling with lessening of natural vivacity; there is a diminished sense of adequacy of power, and tasks seem difficult that after rest will appear easy enough. An abatement of power to control the motor mechanism is apparent as requiring more effort of attention. This is normal fatigue; it will be seen that in every phase of these activities the attention shows the effects of fatigue in lessened control. Restoration follows when in the repose of rest and sleep, the circulation removes the acid waste products, etc., that caused the somnolence, while it supplies the materials for rebuilding the cell-contents so that they may again yield energy upon being stimulated.

Mental Symptoms in the Genesis of Pathological Fatigue.—When the process of restoration is continuously incomplete, and after a time a similar degree of exhaustion is persistently established, the symptoms may not be quite the same in respect to the toxic influences. It is plain that there will have been going on an active process of removing them, though incompletely; and we have to conceive of a partial inanition and an irritating intoxication as contributing to the "excessive irritability" when it

exists, as it commonly does, in neurasthenia. Then the normal fatigue has passed over into pathological fatigue. Recurring now, for example, to the picture of evening fatigue, after a day of hard work both physical and mental, a significant sequel might follow it. Suppose then you are suddenly called to a patient, whose life is in danger. You are aroused. For many hours you may anxiously work over the case with no apparent lack of energy or failure of the resources of your experience and skill. But when relief comes, and you try to get rest in sleep, you only lie awake, restless, your mind excitedly reviewing the scenes you have passed through, your will powerless to inhibit the train of ideas, and you have a painful sense of nervous tension and irritability.

There would seem to be in this condition a ready explanation of acute exhaustion, or excessive fatigue and toxicity. This is the initial stage of pathological fatigue. Such an incident is instructive in many ways. It shows how the store of nervous energy is held in reserve, within the limits of normal fatigue under ordinary stimulation. But unwonted interest being aroused and attention stimulated, the mechanism responds with an increase of cerebral circulation, and large cortical areas are probably excited to action. While more nutrition is thus taken up, more energy is given out; and although there is a more rapid removal of waste products it is not complete, and these gradually accumulate until some degree of exhaustion is manifested. Then in the search for the power of control over mental processes, the attention failing in its office becomes conspicuous by its absence or lessened power.

The mental mechanism is commonly stimulated to action by the external circumstance, as in the incident just related. The interest excited by the event arouses the attention which, acting in both its reflex and voluntary forms, intensifies all the mental activities. A like experi-

ence is still more common, in which there is absence of immediate objective interest, and the mental action proceeds more subjectively and from volition. Take another instance of evening fatigue, and suppose, for example, you have been delaying the writing of a medical paper which must be read to-morrow. With fatigue equal to that yielded to many times before, you approach the task to which a mixed interest is now added by your reflection upon the need of preparation and the consequences of failure to acquit yourself properly. With much effort of will and attention, you apply yourself to the beginning of the mental work. Presently the sense of fatigue and effort has passed away,—the subject itself gathers interest,—and you have a sense of satisfaction in the exercise of mental power. You may desist at last, not with consciousness of mental fatigue, but because the lateness of the hour claims your attention. But as before you may lie awake with an over-stimulated brain and weakened inhibition; and this condition may represent simply a less degree of over-fatigue than in the former instance.

In the first of these two cases, external circumstance furnished the immediate stimulating interest;—in the latter case it is memory and expectation, but the attention is more clearly voluntary and the whole process subjective. In both cases the rôle of the attention is apparent. It becomes evident also that the feeling of fatigue does not measure it, but only represents the fact of fatigue within normal limits, beyond which there is a reserve of nervous energy that may be drawn upon by stimulating the nervous mechanism through an extra effort of voluntary attention. The explanation of the attendant physiological processes throws light upon the whole matter. Ribot[1] says it is highly probable and almost universally admitted, that attention, even when not directed toward any region of the body, is accompanied

[1] Op. cit., p. 19.

by local hyperæmia of certain parts of the brain. This result of the greater functional activity is caused by a dilatation of the arteries, which itself is caused by the action of the vaso-motor nerves upon the muscular integuments of the arteries. But the vaso-motor branches of the great sympathetic are independent of the action of the will, and are not influenced directly by voluntary attention; they are however subjected to all the influences of the emotions. It is shown by the experiments of Mosso and others that the slightest and most transient emotion causes an afflux of blood to the brain. Maudsley[2] says, "We may fairly conclude that the effect of attention to a current of thought is to quicken the circulation in the nervous sub-strata which minister to it; not otherwise than as when some earnest thought has taken hold of the mind, it keeps up an active circulation in the brain, and will not let us go to sleep."

These considerations enable us to distinguish the main elements of the mechanism that were involved in the last two cases of evening fatigue. In both, interest and emotion were the immediate excitants of the increased blood-supply and brain activity;—in one, the emotion attended the thought of the external circumstance of a patient in danger, and attention was largely spontaneous,—in the other, the emotion accompanied the thought voluntarily chosen to be held in attention, although its interest was more remote. So the attention once becoming active, in whichever form, the same results then followed in either case, and the order was as follows:—attention, intensified ideas with mental feeling of interest or emotion, vaso-motor dilatation, quickened circulation and nutrition, increased expenditure of energy and waste products, and over-fatigue to the degree of exhaustion and irritability.

These phenomena of our commonest experience therefore bear this plain interpretation. It is fundamental in our

[2] Physiology of Mind, 3d Ed., p. 316.

nature, in the earlier stages of development, as in children and animals, that our inner physiological activities and their expression in conduct are largely subject to the feelings,—our mechanisms are driven by untutored interests, emotions or blind instincts. But in the later development of the acquired forces of intellect and will, we control, select, and direct, through attention, the chosen, impelling interests, combined with much yielding and consenting to the primary forces of our emotional nature.

It is a common clinical observation that, with the beginning of failure of higher psychical control, the more mechanical laws of cerebration are brought more freely into play, and we come at last to the phenomena of weakening attention as the index of the more spontaneous flow of ideas along the paths of habit and association. Fatigue of the power of voluntary attention, which goes along with cerebral fatigue, is equivalent to the beginning of the failure of control.

In the mental conditions last described, the symptoms of a general and cerebral neurasthenia thus developed reveal the importance of the attention, and the high office of its voluntary power in respect to all mental activities. In the abatement of natural vigor in any of them, the physician should see signs suggestive of neurasthenia.

The Sense of Effort, and Discharge of Energy in Attention.—A further development of symptoms may follow if the patient continues in a neurasthenic state. While the action of spontaneous attention is always without a sense of effort, as in its passive exercise in revery which may be restful, it may on the other hand when concentrated, as in continued worrying, be accompanied by expenditure of energy and cerebral exhaustion. Hence the maxim that worry is worse than work. But voluntary attention is normally accompanied by a discharge of energy and a sense of effort. The feeling of effort is at a minimum when the

body is strong, but with increasing fatigue the sense of voluntary effort grows greater because more is needed to accomplish the same result as before. This of course is attended by a conscious sense of mental inadequacy through a sense of resistance to effort, which, added to the feeling of physical inadequacy already existing and accompanied by painful emotion, increases the force of self-depreciation. There is deeper depression, more intense worry, increasing cerebral exhaustion, and lessening mental control by will and attention.

Correspondence of the Train of Mental and Physical Events in Neurasthenia.—The preceding analysis of these conditions shows what may be the train of concomitant and increasing disturbances of nutrition:—there is local and then general inanition and irritating auto-intoxication,—then vaso-motor constriction, perhaps from irritative elements in the blood, and local or general anæmias,—or a vitiated blood-supply that does not nourish,—or again a hyperæmia from which we may infer a constriction-paralysis, in a condition manifested by a temporarily increased activity, and mental facility which is still a manifestation of inhibitory weakness. Thus a process beginning in the general organism, perhaps with disorders of digestion, may lead by a sequence of events to such results as these. The causes continuing, or being renewed after partial recovery, which may happen many times in a single case, the descent to graver degrees of exhaustion in melancholia may be accelerated by insomnia. This, we have to infer, is due to a hyperæsthesia from weakness and toxic irritation of the central mechanism.

The process may begin with an earlier event:—through necessity or mistaken zeal the individual over-exerts his brain in mental work under the spur of interest and forced attention. Here is indeed purely mental initiation of cerebral exhaustion which may start the train of events even in a strong man. Then with an over-worked brain, and under-

worked respiration and muscular movements, as in sedentary habits, the cerebral waste of tissue is increased and the nutrition is diminished, by both local and general conditions. Such a special condition, for example, as the uric acid diathesis, may be engendered by deficient elimination. From a cerebral neurasthenia all the other events may follow. In this form, however, there may be failure of special functions, as of memory, for example, in some of its elements. A not infrequent symptom is forgetfulness of names and words,—the fatigued word-memory centres are slow in recalling, or the word-uttering centres are slow in acting, and there are the symptoms of brain exhaustion with a hesitation of speech that is unduly alarming. The mental work of a physician or a lawyer is a good example of a peculiar strain of these central mechanisms. There is the daily continuous effort of listening to the details of medical cases, or to evidence and pleadings in some important cause, often followed by work at late hours. It is not strange that there should be a consequent condition of special fatigue of the attention and memory.

The Unity of Conditions in Neurasthenia and Melancholia, etc.—The essential element in all cases is, that the fact of a profound deterioration of nervous energy in the organic basis is represented mentally as a more or less vague sense of failing power, together with a conscious reduction of mental control. This is true alike for neurasthenia and melancholia, as has been shown.

Alienists have long recognized these morbid states as associated with variations of nutrition and as fundamental to melancholia, hypochondria, and other like disorders.

Meynert[1] believes melancholia to be a symptom of disturbance of nutrition of the cortex of the hemispheres dependent upon diminished blood supply. Benedickt[2] believes

[1] Wiener Med. Presse, June 6, 1889.
[2] Medicine Moderne, Feb. 5, 1891.

that neurasthenia is a psychic disease of cortical origin, due to emotion and overstrain, and that it is peculiar to the learned professions and business demanding trained, alert intelligence. Marcus[1] describes neurasthenia as a change in the functional tonus of the whole central nervous system, with increased excitability and tendency to exhaustion. The patient is always depressed on account of his incapacity, which leads to doubt, anxiety and hopelessness, with a feeling of inadequacy to ordinary effort. These patients are neurasthenic, he says, before becoming insane.

Thus it is to be seen that the neurasthenic condition, being dependent primarily upon nutritional weakness and presenting a train of definite mental symptoms, may, when once established, grow worse by degrees even to the profoundest melancholia, in which the same physical conditions and the same mental symptoms, from like causes as in neurasthenia, are present as a part of the characteristic group of symptoms. It may be said, as Beard tried to show, that neurasthenia is not melancholia, but it cannot be said that melancholia is not neurasthenia. Many cases called neurasthenia are as truly mild melancholia. It is a matter of the degree of exhaustion; in the graver degrees new symptoms are added. Further evidence of this is to be seen in the study of the intellectual symptoms in still more profound degrees of exhaustion. But it is already evident from these considerations that, in all these conditions, the symptoms are dependent primarily upon changes in the organic basis of the personality.

Definition of Neurasthenia.—A summing up of the conditions that furnish the clinical manifestations of melancholia would include those of neurasthenia and more. The study of melancholia, as has been said, is therefore instructive as revealing the import of the milder manifestations in neurasthenia. The common conditions of nervous weak-

[1] Allgem. Zeitsch. f. Psych., xlvi. 487, 1889.

ness and irritability, and of the special weakening of the attention and mental depression, have been sufficiently noticed. But one other prominent condition should be taken into account in the definition of neurasthenia. The physical lassitude and languor, and motor weakness, pointed out by Brunton as suggesting curare-poisoning, has its counterpart also in the condition often observed in melancholia and characterized as mental stupor which it simulates. The definition of neurasthenia, properly extended to include the more prominent manifestations, both mental and physical, may be stated as *a morbid condition of the nervous system, the underlying characteristics being excessive weakness and irritability or languor, with mental depression.*

Cerebral Neurasthenia, and "Insistent and Fixed Ideas."—Cerebral neurasthenia being once established the general form is then usually developed; but the first may exist by itself, as has been shown, and be of long standing in a healthy organism. The same is probably true of spinal neurasthenia. This central affection is likely to involve, directly or indirectly, other co-ordinated mechanisms. An acute neurasthenia may be rapidly developed by mental shock or the like; it is as if, by a great discharge of energy, the brain cells are quickly brought to a state of exhaustion with inability to perform fully their function of taking up nutrition, or to act in their normal and habitual associations, because of being "thrown out of gear."

A unique form of cerebral neurasthenia may be brought about by the affections known as "insistent and fixed ideas." These are often started accidentally as uncorrected associations of ideas and feelings, and being at first purely disorders of ideation they become fixed by habit and intensified by accompanying emotions usually painful, and sometimes engender great worry and anxiety, because the patient is conscious of his inability to control his own mind against the ideas he knows to be absurd. The worry in these cases

may cause a true cerebral neurasthenia. There is a special form of these "fears" that is the most likely to lead to a true melancholia in cases in which there is a strong body with a tired brain,—it is the fear of heredity, when based upon a fixed idea that may have some appearance of truth and cannot be corrected as being absurd. Then the worry is increased both by habit and fatigue. In general it should be said that "insistent and fixed ideas" are primarily accidental disorders of ideation, often occurring in the strong but more likely to happen to the weak. They are the cause of neurasthenia quite as often as they are a symptom of it. The morbid association being once formed, it becomes fixed by habit, inducing or increasing the cerebral fatigue, and constituting an association-psychosis, or more properly an association psycho-neurosis. When these affections are better understood, an explanation will probably be found for much that is now called hysteria, the neuromimesis, etc., including, in the insistent associations, other feelings than fears, that occupy the attention.

Secondary, Chronic, and Hereditary Neurasthenia.—The forms of neurasthenia so far discussed are those that are acquired, acute and primary. Secondary neurasthenia, or the form occurring after other definite diseases, often not nervous, must be regarded as belonging to the class having special toxic causes. The poisoning may be direct, and sometimes recurrent, as in the specific constitutional diseases, due to, or inducing, nutritional and degenerative disorders, such as gout, rheumatism, syphilis, etc. Or it may be indirectly due to such diseases as puerperal fever, typhoid fever, etc., in which it may be inferred that, although the toxic materials have passed away, a process of inanition once started persists, or continues to develop. Chronic neurasthenia has already been characterized, and includes conditions of partial recovery, in which a "constitutional predisposition" is fully acquired and established. This is

consistent with periods of partial efficiency and comfort, with lessened reserve energy.

Hereditary neurasthenia, as a transmitted predisposition, is a usual cause of localized neurasthenia in special systems or organs. In these cases and in those with a general neuropathic condition, often inherited, there is a tendency to all forms and degrees of neurasthenic disorder, for the reason that, it being a condition of nervous instability and weak resistance, the organism yields to slighter degrees of stress than in ordinary states. The nervous equilibrium becoming unbalanced by slighter causes the departure from the general habitude of the individual is less, and restoration to it easier, than when the normal resistance is great and the break-down is a greater change. When a strong man breaks down it may therefore be more difficult for him to get well than for one less robust and stable. When there is such a predisposition, however, the prophylaxis should be more diligent against neurasthenia and mental disorders. It should be remembered also that in these neuropathic cases one may inherit a strong brain and a weak body, and *vice versa*.

Symptoms.—The symptoms of neurasthenia, being manifestations of weakness of the nervous system, proceed from variations from the normal condition of nerve-cells,—molecular and chemical, not yet demonstrably pathological, and implying a weakened or changed nutritional power. The vascular changes—the cerebral and spinal hyperæmias and anæmias—are due to disturbances of the inhibitory vaso-motor centres. As Dana says, "Neurasthenia is primarily cellular and secondarily vascular." Local anæmias may be initiated by an irritative blood-supply,—the vaso-motor constriction starting the deficiency of nutrition in the nervous centres; we may infer that this leads sometimes to hyperæmias, just as digitalis first stimulates the cardiac inhibition, and then by over-stimulation and a toxic effect paralyzes it.

The fundamental and initial condition being thus a weakness of nerve-cells from excessive waste and deficient repair, to which there is a toxic addition to the "fatigue," then two types of symptoms must be recognized,—those characterized by a too quick response to stimulation, due to "irritability" or hyperæsthesia, and those due to a slowing or annulment of functional power, manifested by "languor," or even a complete suspension of function. These conditions of abated power, with "irritability" or "languor," occur in different degrees, and are common to the sensory, central and motor parts of the mechanism; they often affect one part more than the others, according to the localization of the "fatigue," or the kind of toxicity. The symptoms of neurasthenia are mainly *subjective*.

The *objective* symptoms may be first considered, by noting the common physical conditions. There is a general appearance of abated vigor, bodily weariness, languor and mental depression, and loss of weight. There is not necessarily anæmia, but this is common in young persons and women; it is not present in many adults who may be physically well-nourished or plethoric. There may be tremor of the hands, sometimes only following muscular effort or mental excitement. Uneasiness, restlessness and excessive irritability are also common.

Loss of vaso-motor tone is indicated by cold hands and feet, and the temperature is often sub-normal in the more exhausted cases. Morbid blushing is common in nervous exhaustion in both sexes, from slight mental or physical causes. A characteristic form of the blushing is that which occurs in patches upon the neck and cheeks, of a bright color and with well-marked borders slowly spreading. This may appear with only the effort and interest of an ordinary conversation. The disturbances of the circulation are marked by cardiac palpitations, and the phenomena of an "irritable heart." The pulse shows frequent and rapid

variations in arterial tension; it may be reduced in frequency with increase of tension, or be more frequent and weaker, and often quickly accelerated by exertion or slight emotional excitement.

Dilatation of the pupils is a common symptom, and may be due to paralysis of the third nerve or irritation of the sympathetic. These suggest nervous weakness, irritability and perhaps different toxic influences. A striking peculiarity is a quick and frequent alternation between this and contraction. The atonic voice is peculiarly significant,—it is faint and husky, and frequently varies in force. Sometimes it will suddenly change to a higher pitch and sound thin and weak. Respiration is not changed in frequency, but deficient respiratory expansion may be observed, with the symptoms of compensatory sighing and yawning.

The appetite is poor; there are disorders of gastric and intestinal digestion, gastric irritability with atonic dyspepsia, and constipation, sometimes alternating with nervous diarrhœa; and flatulence with feelings of distention; there is gastric neurasthenia, and a "torpid" or "neurasthenic" liver, and the important toxic consequences. Elimination generally is greatly at fault, by liver, kidneys and skin. The urine varies in specific gravity, being usually low in younger persons, with phosphates in excess. Older persons have more digestive and hepatic disorder, and a condensed urine with sometimes excess of phosphates, urates, and oxalates. Traces of albumen and casts are common in the depressed cases, as in melancholia. The peculiar symptoms of "uric-acidæmia" are so common in neurasthenic conditions that a careful study of this toxic element is likely to be profitable.

Neurasthenic irritability of the bladder and urethra occurs in both sexes; and in women the lowered nervous tone is manifested in menstrual disorders. While amenorrhœa occurs, particularly in the graver cases, as in melancholia,

etc., it is often physiologically conservative; there may be an increase of the flow, and even the ordinary amount, in anæmic conditions, becomes relatively a hæmorrhage. Many such cases are kept indefinitely in a state of exhaustion by losing monthly all the upbuilding they can gain. Irregular menstruation and dysmenorrhœa are also common. Women in general suffer more than men from sensory and irritative symptoms,—there is more pain, headache, and neuralgia, and the complications of hysteria occur. The diseases peculiar to women may be either the causes or effects of neurasthenia. The symptoms of sexual functional disorders, generally, should always be first studied carefully, as probably expressions of a general neurasthenia. This is true also of the disorders peculiar to adolescence and the climacteric,—at the latter period of life men also are prone to neurasthenic troubles.

Insomnia has already been especially noticed as a symptom of irritability,—a cerebral over-excitation from local irritation, or that condition initiated by intensified interest and attention until the symptoms of "fatigue" supervene. Macfarlane defines insomnia as an evidence of vigilance in the cerebral cells, initiated and maintained by some perturbing element in the system, of which it may be the sole symptom.

The *subjective* symptoms are thus broadly characterized for convenience, as those of which the patient himself gives account. This division from the objective symptoms is open to criticism; the thesis of this discussion is, in part, to show that the inner conditions are largely revealed by mental symptoms which are obvious to the clinician who obeys Krafft-Ebing's injunction to pursue an untiring observation of the psychical processes. While the patient may describe his feelings and tell his thoughts, in their subjective aspects, the clinical observer sees the plain and often contradictory significance of the patient's unwitting expressions of mental

phenomena that are objectively manifested in his appearance and conduct. The physician, taking into account all the data, solves parodoxes and makes interpretations, that the patient cannot make of what he feels and seems to perceive. It is a part of the present purpose to make clear some of these apparently conflicting indications.

The study of the symptoms of neurasthenia means, then, the observation, and the careful analysis and discrimination, of the physical signs on the one hand, to differentiate them from the manifestations of more definite nervous diseases which are so often simulated in this disorder. We have, on the other hand, with these observations as guides, to discriminate in like manner the mental signs as expressed in the patient's appearance, conduct, and speech. The subjective symptoms are, therefore, of two kinds,—what the patient tells of his bodily sensations and mental feelings, and of his ideas of them, and what he manifests otherwise as expressions of his mental condition. The business of the physician is to make an interpretation of these phenomena, consistent with physical facts, and to give his patient treatment that is often as much of the mind as of the body.

The first and most obvious mental signs, taking the evidence from both of the sources just specified, are the characteristic depression of feeling,—lowering of emotional tone and a sense of ill-being. Coincident with these, but derived more from the patient's own statements, are a decrease of the power of voluntary attention,—attention becoming reflex,—and sometimes decrease of the power of memory in its elements of retention and recalling, and in the association of ideas. The first order of these symptoms represents, in the changes of emotional tone, etc., the concomitant changes in the organic personality,—the patient speaks despondingly and appears dejected,—he has "the blues." The second order shows, in the lessening of men-

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tal activity and inhibitory power, the abatement of cerebral energy,—the patient becomes conscious of this because of the increased sense of effort, and he may tell of it before it can be observed by others. The sources and "mechanism" of these two orders of symptoms have been shown.

A third order of symptoms proceeds from the first two, as has been shown; it is somewhat later in appearance and marks a graver degree of nervous exhaustion. It includes introspection, or dwelling by attracted attention upon anxieties or painful ideas, intensified by the prevailing emotional tone,—retrospection, which is a constant and striking symptom in those who, from a sense of inadequacy, lose hope and therefore *interest* in the future, and find it in the reviewing of past experiences, errors or wrong doings,—and apprehension, as sometimes a feeling of hopelessness, or vague fear of inability to meet the requirements of the future or the consequences of the morbidly intensified memories of past misdeeds. These constitute the condition of worry and hypochondria.

All these orders of symptoms are usually present in slight degrees, and coincident at the very beginning of pathological fatigue. Their severity increases with decreasing energy,—from transient "fits of the blues" to the most marked forms of the disease. When the condition continues, reasoning is likely to be soon influenced by the bias of morbid feeling, and the law of practice, habit and association comes in, tending to fix the morbid "habits of thought" as well as the disorder in the concomitant physiological processes. Then secondary effects begin to demand discrimination, and the force of habit must never be forgotten. For example, a business man, having become neurasthenic from over-work and worry, may attend to his affairs, with excess of application, and feel better doing so, through the effect of habit, and the stimulating effect of attention and interest as excitants of cerebral activity and a quickened

circulation. Let him attempt, however, to turn his attention to other matters, as to rational recreation, and his loss of power to control his own mind betrays itself. At the beginning of the attempted relaxation, as in taking a vacation, there is more of mental effort, and of the depression of feeling, than in keeping on with his habitual occupations, though harmful. Or, again, such an experience as that described in a letter from a medical friend, who has had large success in treating neurasthenia, and who contributes unintentional testimony on this point, as follows:—"I have been feeling so good-for-nothing and so blue that I have feared almost everything. These 'rheumatics' are not very comfortable companions, and the fear that they might get so bad as to prevent me from riding, has depressed me a good deal. I know that in other ways I am much better than a year ago, but in the past three weeks, when the letting up of work has come, there has also come a letting down of spirits. The work now is not more than one third of what I do when decently busy, but I get very tired when evening comes. I am all played out." It is altogether probable that had not his active season been terminated so soon by the summer vacations, he would have gone on with his work and postponed the onset of his "fatigue" and the return of his annual attack of sciatica,—but doubtless with more serious consequences at a later day.

These cases show the three orders of symptoms, and represent later stages of the conditions noted in the two examples of evening fatigue illustrating the genesis of pathological fatigue. They bear also a curious resemblance to another very common experience:—An occasion of severe mental labor,—perhaps of night-work and little sleep,—is followed by a day of excitable alertness of mind and body; there is a sense of nervous strain, but with an undue mental facility and physical irritability. But after the next night's rest a sense of fatigue, languor, and *malaise* may

come—the second-day tire that leads to the inference of the elimination of an irritating stimulation revealing the real fatigue. In cases of neurasthenia, at more advanced stages, from long-standing or a more rapid development, the effects of habit upon the disordered physiological and mental activities become more pronounced. New symptoms also appear, due to greater changes in the nutritional processes, and particularly in the sensory mechanism.

The three orders of symptoms described refer to strictly mental phenomena and contain no mention of the irritability and languor common in this disease. These latter symptoms are both mental and physical, and they are direct manifestations of changes in bodily conditions. They now remain to be characterized as constituting a fourth order. We have therefore to examine further the subjective symptoms in respect to altered sensations. They include both those from the special senses and the largely predominating organic sensations. They may be distinguished as hyperæsthesia, paræsthesia and anæsthesia.

Hyperæsthesia may be held to include all the phenomena of excessive irritability. It may be sensory or motor, or central and mental. General morbid sensitiveness is manifested by "nervousness" and restlessness; the patients, especially women, have a sense of "tension" and difficulty of self-control. There may be irritative and neurasthenic conditions of all the organs and minor mechanisms. The local hyperæsthesias are very many—as of touch, in which however there is no real increase of delicacy, but almost always a diminution. In many cases the commonly unperceived organic sensations are intensified. The sense of pain belongs to this group of "common sensations," and they include the neuralgias along with which there may be a duller perception of tactile impressions. Itching, burning, and other conditions bordering on pain, are included in this group of sensations that differ from the tactile sense.

Sensitiveness to ordinary stimuli in the organs of special sense, particularly of sight and hearing, is common. The visual troubles are not very serious, but there is always some weakness and increased irritability. Reading causes fatigue and pain and leads to headache; and there is sensitiveness to light. Muscular insufficiencies occur. Visual memories are lessened. The hearing is over-sensitive in many cases, and the patient is very intolerant of slight noises. This may be due to the general mental irritability, and to expectant attention. These neurasthenic symptoms may be continued after recovery as the effects of mental habit. Hyperæsthesia may be regarded as the first degree of sensory disorder and weakening.

Paræsthesia, or perverted sensation, may be considered as representing a second degree of sensory disturbance and change from normal feeling, and may be general or local. Internally these disorders include giddiness, vertiginous sensations, a sense of muscular relaxation, etc. According to Gowers, the afferent impressions constantly passing to the cerebro-spinal centres, fail to affect consciousness under normal circumstances. But repeated attention may vastly increase the sensitiveness of the perceptive centres to such impressions, and from such increase arise sensations of great discomfort, sometimes amounting to pain. In the case of an intelligent lady whose conscientious efforts to disregard her ills stamped the description as genuine, there was, at times for many months, a feeling "like a stream of pounded glass running down the spine into the pelvic cavity." There may be perversions of the peripheral sensations, as pressure on the top of the head and of a band about it, a sense of expansion of the skull or as if it were empty. Feelings of flushing, both local and general, may occur, and numbness and coldness as alterations of the temperature sense, etc., in different parts of the body. This and the sense of pressure are to be distinguished as special functions, differing

from tactile sense. Creeping sensations, tinglings and formication, are common among the paræsthesias.

Anœsthesia is the final degree of changed sensations, and may be partial or complete. For example, numbness of the hands and feet is not uncommon; and there are limited anæsthesias of the tactile sense in various parts of the body, or this being retained, there may be analgesia as simply the loss of the sense of pain. The lowering of sensory activity in general, or diminished sensitiveness, has been observed. This is common enough to demand recognition as one of the characteristics of neurasthenia along with "excessive irritability;" in both alike there is probably a toxic influence, or its secondary effects. There may be limited areas of anæsthesia or hemi-anæsthesia, particularly in hysterical conditions, although "hysteria is essentially a mental disease involving the emotional faculties and the will."

The importance of these altered sensations is very great for their diagnostic value and as a guide to treatment in neurasthenia. Such disorders of the sensory apparatus of the special senses, as is well known, lead to the illusions and hallucinations, or disorders of sense-perception, in the graver degrees of the exhaustion of melancholia and mania. But the organic or common sensations are of fundamental importance, for, according to Ribot, "As the organism, so the personality." Taking the evidence of our bodily feelings, the sense of physical personality is the organized and coördinated sum of its elementary factors. Persisting alterations of organic sensations are aberrations of the physical personality, or as Bertrand calls them, "the hallucinations of the sense of the body." A man believes himself to be what he feels himself to be. He finds in the evidence furnished by the sum-total of his feelings the data for his judgments of himself. These sensorial alterations are doubtless expressions of more deeply seated disorder due to localized and limited derangements of the circulation. A

limited central exhaustion and excitation may be accompanied peripherally by vascular irritability and disturbance.

The relation of these altered sensations to their mental effects has been considered, and something has been said of the converse effects of mental states, as to the emotional tone and attention, upon the physiological activities. The mutual influence of mind and body upon each other is of great importance here, as to the causation of the conditions manifested by these changes in the organic sensations. Mosso has demonstrated that hyperæmia of the brain is coincident with mental work. It is physiological that centres becoming inactive resume a normal and comparatively anæmic state. The removal of the excess of waste that attends activity being accomplished by due periods of rest, the centres recover their normal condition, and work may be resumed on awaking from sleep. With over-work of the brain, and prolonged and probably localized hyperæmias, the exhausted vaso-motor apparatus becomes unable to control the blood-supply; local and relatively chronic hyperæmia in the over-exercised centres may follow and become pathological. In this state work may be continued by voluntary effort, but there is sleeplessness, and breaking down of the general health. The exhausted and poisoned brain, and nervous system generally, afford only a defective innervation to the various organs of the body; and the characteristic symptoms of dyspepsia, constipation, palpitation, and the like, appear, with all their sequelæ of altered sensations.

Macfarlane[1] describes the symptoms of this condition of neurasthenia as tolerably uniform,—sleeplessness being one of the most urgent, usually associated with throbbing blood-vessels and restless cerebration, dreams connected with the daily work, and the sleep obtained being disturbed and unrefreshing. The element of worry has been shown to be

[1] Op. cit., pp. 78–82.

a prime factor in all these neurasthenic conditions. It is especially noteworthy that Macfarlane mentions certain symptoms of present interest,—they are the most prominent signs of the earlier alterations of cœnesthesis so well studied by Ribot. The former says, "Exhaustion and misery are felt in the morning; depression, despondency, and irritability during the day. All mental and physical work is accomplished with an effort, concentration of thought is difficult, and headache is seldom absent."

Two Special Conditions resulting from Changed Sensations.—The more greatly altered sensations, when localized and limited, may be estimated correctly, while the more general and pervading ones cannot be so well corrected. There are two prominent conditions due to changes in these general sensations that are of the highest clinical importance in neurasthenia.

The first of these conditions is "*morning depression*" or "*morning tire.*" It is sometimes called "*morning misery,*" but the tire is the essential fact. Both the mental feelings and the common sensations are altered by increase of intensity, and measurably represent the truth as to the bodily condition, although they still appear contradictory and lead to mental error. For example, a patient having fairly comfortable and cheerful feelings during the latter half of the day and in the evening, sleeps more or less well till the early hours of the morning. But on awaking he is in the depths of depression. Instead of being refreshed by sleep, all his feelings of inadequacy, misery and hopelessness are then at their keenest. The physical signs of exhaustion are more manifest. The patient feels added alarm because the sleep has not done him any good in the natural way. After breakfast he feels better, and by the middle of the forenoon his circulation is again active and steady and perhaps accelerated. The press of business and the daily interests are stimulating, and his nerve-cells, while probably giving

out as much as they are taking in of energy, are evidently better nourished than in the nocturnal condition of functional inactivity. This symptom is significant by its daily recurrence. It is among the leading ones of neurasthenia; and it may occur in all degrees, from the morning feelings of being unrefreshed, to a recurring sense of misery and despair that prompts to suicide. The physician should detect this symptom of morning tire and depression, which appears early in the disease, and should not be misled by the patient's evening sense of comfort. The morning more nearly represents his true condition.

This symptom of "morning tire" has long been observed in melancholia, but it is now being better explained as evidence of neurasthenia. The "mechanism" of these phenomena of "distressing awakening," is most complex and involves the problems of the physiology of sleep, the rhythm of nocturnal rest and relaxation and daily activity, and the "pathology of night," of which interesting studies are of late being made.[1] A valuable bibliography of the subject is given by Ch. Féré.[2] Broadbent[3] says, "It is in the early morning that depression of spirits is liable to be at its worst in nervous debility, so called; or there is the morning headache which is relieved by the bath and breakfast, or wears off as the day advances; or the subject of this affection is more tired on waking up than on going to bed." Haig[4] says he has "no difficulty in proving that it is just in these early morning hours that the excess of uric acid in the blood is greatest, and its effects on arterial tension most marked." Uric acidæmia in its relation to disorders of the circulation, and to irritability, languor, and depression, certainly invites careful inquiry.

The significance of these tired awakenings is very great,

[1] See Macfarlane, Lancet, Vol. I., 1891, p. 824.
[2] Art. Pathology of Night. Brain, Oct. 1889, p. 308.
[3] The Pulse, p. 76.
[4] Loc. cit.

as a symptom of morbid sleep which may be due to a variety of causes, involving particularly the weakness of functional power, through its exhaustion or annulment by toxic influences as in neurasthenia.

The other special condition is that of *anæsthesia of the sense of fatigue*. It results from altered organic sensations; and the truth as to the bodily state is obscured by the change or absence of certain data of sensation that go to make up a man's judgment of himself. The indications are paradoxical and misleading.

In the example of morning tire just mentioned the excessive work and worry might go on with increase of cerebral or general exhaustion; also the mental misery of the morning might be continued. Then a strange phenomenon may happen. The patient, who has before complained of his fatigue, now says he does not feel tired. He may have no definite sensations of inner discomfort from the dyspepsia, constipation, etc., although the general miserable feelings will continue with lessening or disappearance of the evening recuperation. Still, he claims that he is not tired,—that there is nothing the matter. His attention is more and more concentrated upon the objects that have habitually interested him, or upon his morbid ideas, with lessening power to turn from them. Thus the process goes on in its vicious train.

This is one of the commonest of all symptoms, and often appears early and in slight degrees. It represents the descent of the patient's condition towards the depths of nervous exhaustion, and to a point where the sensory power itself is materially lessened. The patient, previously guided by the sense of fatigue in desisting from effort, has now lost his guide,—his natural feeling. He cannot believe his physician or his friends that he is over-tired. He is conscious of inefficiency, mental and physical; and he feels added self-reproach because he cannot accomplish what he ought

when he does not feel sufficiently ill or fatigued to justify relaxation from duties that are pressing, or seem so to him. The stimulation of change, travel, etc., is often prescribed when there is this fictitious appearance of the patient's ability to bear it. Tired women will carry on their domestic duties by "working on their nerves," or walk for miles without natural fatigue, seeking health in "exercise" when it is most damaging. This symptom comes out most clearly in cases that have advanced to melancholia, but it is a true index of the neurasthenic state in all its stages, and has its lesser forms in many of the milder cases. In the extreme cases the lifting up of such patients from the depths of exhaustion is a most interesting process to watch, when they "come to the sense of feeling." If previously agitated, restless and apparently unfatigued, they grow more quiet,—sometimes they take to their beds with a profound sense of weakness. They say they feel worse, and are alarmed as well as their friends; but they are really better. This is a distinct stage in the upward progress toward recovery.

The conditions of melancholia, in its most neurasthenic stages, are among those in which this symptom of change of the sensations that go to make up the sense of fatigue is most plainly declared. In one class of cases there are the conditions of diminished sensitiveness, dulness or languor, affecting in different degrees both sensory and mental activities even to the degree of apparent or real stupor, in which the motor paresis is so striking a symptom. There is in these cases a manifest consistency in the presence of a blunting effect upon the sense of fatigue. It seems consistent enough also in that class of cases in which there are the associated symptoms of mental agitation, irritability and restlessness as manifestations of hyperæsthesia, that are continually prompting the patient to motor activity,—just as analgesia may exist with a hyperæsthesia which itself is attended by a diminution in delicacy of touch. It is of

course true that the attention plays its part in the matter,—the attention being occupied by intensified ideas and emotions either of pleasure or of pain, there may be, for the time, an unconsciousness of the sense of fatigue that might be felt if attended to; so it is in hypnotism, or when contusions are not perceived in a foot-ball scrimmage, or even fatal wounds in battle by men who live long enough to tell of them. But this fact does not militate against the validity of clinical observations and confessed experiences in the cases of many intelligent patients in whom the condition is of long continuance. In the extreme cases of agitation and restlessness, as is well known, the patients will walk and walk by the hour, sleep fitfully, turn in their beds or leave them many times, often restlessly changing their positions by day and by night. Like symptoms of restlessness are observed also in many cases of neurasthenia without the mental symptoms requisite for a diagnosis of melancholia, but both these classes of patients often declare the absence or blunting of the sense of fatigue. It should be understood that these references are made to melancholia because it presents this symptom in so pronounced a way as to reveal its importance, and something of its nature; its recognition in its lesser manifestations in neurasthenia thus becomes easier.

This phenomenon appears in cases presenting such early stages as those described to illustrate the genesis of pathological fatigue. There is evidence of this peculiar symptom in the graphic statement, quoted from the physician who felt excessive tire and the "letting down of spirits" as soon as his work was reduced to one half of that he had just previously been doing. All the conditions of the "fatigue" were undoubtedly present before the "letting up of work" in which the exciting stimulation to activity possibly created peculiar toxic products which obscured the real condition. At all events, in such conditions as these and the equally common experience of the "second-day tire," there is that

state of pathological fatigue which is marked by a notable absence of a due sense of tire. It is certainly obvious, as a physiological fact, and as a clinical observation, as in the illustrative cases, that the degree of bodily and mental fatigue is not measured by the feeling of it. It is one of the most familiar of all familiar facts that men and women are continually over-doing themselves without knowing it. When a condition of pathological fatigue is established, this anæsthesia of the sense of fatigue, in some degree, becomes a part of the general condition. It is important to recognize it,—to give it a name,—to teach the patient to understand it,—and then its great value as a diagnostic guide to treatment will appear. Knowledge of it also has often the happiest effect upon the patient in gaining that condition which Mitchell sought before the rest treatment could be begun,—"the absence of thought with the friction of worry which injures." The patient being at fault in attempting to judge of himself by his altered and blunted sensations, is always alarmed at the mystery of his anomalous and contradictory feelings. With the feeling of inadequacy from a sense of abated motor power there is exhaustion also of sensory power. An intelligent patient always understands when told that there is tire, not only in the power to do things, but in the power to feel the tire. An apparent mystery is readily cleared up by this explanation, because it so fits the facts of the patient's experience. Then he can see the force of the rule that he must limit his exercise by quantity and time, and not by feeling.

In the wide range of conditions from the milder to the severer stages, they are constantly presenting paradoxical phenomena, as they may well do, when the one neurasthenic cause is the basis alike for anæsthesia and hyperæsthesia and all their attendant trains of symptoms which are apparently so contradictory. Not in all cases does this anæsthesia of the sense of fatigue appear, nor always in like associations

with other symptoms. There are different classes of cases also according to temperament, character, and habit. Women with the "New-England conscience" need always to be held back against over-effort, and too early effort in all stages of the disease, particularly of convalescence. Whether or not in the course of the neurasthenia there has been a middle period of melancholia, or the like, the principle is always the same. Then in such cases, in the condition of relative comfort and exhilaration which makes the delight of the period of convalescence, there is always danger of over-exertion. The sense of fatigue not being fully recovered, it is at one time felt and again lost, as a sequence of some indiscretion in exercise—some over-stimulation of emotion, either pleasurable or painful. This is the time for the greatest caution. But when at last the patient feels naturally tired, even though upon moderate effort, and can appreciate the restfulness of repose, then is convalescence assured if conducted with care within the limits of the recovered energy.

This analysis and estimate of the clinical manifestations of neurasthenia go to show how gravely significant and dangerous is the condition which is represented by the symptom of diminished sensitiveness, or anæsthesia of the sense of fatigue. Immediately concurrent with the induction of pathological fatigue, with its dual elements of diminished energy and auto-intoxication, almost the very first effect of these is to begin the annulment of the sense that prompts to the conservation of nervous energy. When this peculiar and very common effect is produced, the greater the exhaustion the less the direct sense of it through the normal channels. The patient vaguely feels a lessened adequacy to effort of body or mind,—a lowering of the emotional tone,—many sensations of misery as emphasized in the morning tire,—much irritability and restlessness,—and all the changes characterized as hyperæs-

thesia, paræsthesia and anæsthesia; in like manner there is alteration of the sense of fatigue, in some of its complex elements.

There is another class of cases in sharp contrast with the type just described. They have usually been long ill and have developed secondary conditions. Rest being at last enforced, by the completeness of the break-down, or becoming a habit by indulgence, the rest treatment is sometimes carried too far, probably, beyond the point where exercise should begin. This is a point difficult to determine, but the positive gaining of weight is a good guide. But in the condition of the prolonged "bed-cases," or in the relapsing cases, there is likely to come, when they grow fat and when they do not, a state in which fatigue is keenly felt. As an extreme manifestation of this is the inability to sit upright, to hear reading or talking, etc.; even the slightest muscular exertion, as the raising of an arm, is distressing, and there is great sensitiveness to sound or light. There is not only "horrible depression" upon slight exertion, but a "terrible exhaustion." The quickened pulse, palpitation, change in color, etc., are physical signs in proof of great weakness in such cases. This appears, indeed, like hyperæsthesia of the sense of fatigue in some of its complex elements: but when these cases are led to convalescence, it is long before the natural sense of fatigue, and resistance to its quick disturbance, is recovered. With the dyspeptic aversion to food, the weakened power of assimilation of what is taken, the discouragement of many relapses, and all the effects of habit, these cases are difficult enough.

The mechanism of the sense of fatigue is obscure, as is the complexity of its origin. The difficulty of distinguishing between the central nervous fatigue and the peripheral fatigue of muscles has been noted. The central sense of innervation, and of the need of increasing effort with the

increasing fatigue, would seem to be necessarily an element in it. But this very mental activity of brain cells is assumed to yield, along with waste products and work, the organic sensations of fatigue. Again, the same is true of the muscular sense, or sense of weight, as affording sensations of work being done, of exhausted energy, or of disability of contractile power. But the muscular sense is said to belong rather to the special senses, and we see it still acting normally in the cases of pronounced fatigue-anæsthesia, when there is no marked ataxic change of muscular coördination, even in very restless and irritable cases. Is it, indeed, but a question of the degree of alteration of the muscular sense? With doses of alcohol, ether, and the like, we may first blunt the sense of fatigue, then more and more the sense of weight, even to its annulment as the necessary element in coördination of muscular movement, and the result may be the ataxy of intoxication. In the transitions between these first and last stages of changed sensations, as the effect of one and the same poison, does the common phenomenon of the anæsthesia of the sense of fatigue in neurasthenia represent but a first stage, as a peculiar effect of some special poisoning? We have not as yet, in the study of these pathological conditions, the data of experimental study to demonstrate the mechanism of this symptom. But we have certainly the final fact of its clinical manifestation, and it stands the test of the practical application of this explanation of it.

With this additional study of these alterations of organic sensations, the way is prepared for a characterization of them in a summing up of the symptoms of neurasthenia. Three orders of these symptoms have been set down; the fourth should therefore include those relating to the alterations of sensitiveness, both in the direction of anæsthesia and hyperæsthesia, and should present the conclusions drawn from this last analysis and estimate of them. The following statement, then, is meant to include, in their four orders,

The Subjective Symptoms of Neurasthenia.

1. Depression of spirits,—lowering of the emotional tone and a sense of ill-being.
2. Decrease of the power of attention (reflex attention), and sometimes of memory.
3. Morbid introspection, retrospection and apprehension (worry, hypochondria).
4. Diminished sensitiveness, dulness and languor (anæsthesia); irritability and restlessness (hyperæsthesia).

These minor orders of symptoms go to make up a symptom-group that forms a clinical picture of neurasthenia, covering the elements of many possible variations of its forms. The sources and mechanism of each order of symptoms have been studied, and this should furnish the data for a precise definition of the disease. That of Dana has already been amended, in these pages, to include the element of languor that represents the fundamental element of toxic blunting of sensitiveness; and while this, and the specification of excessive weakness and irritability, imply a mental element, the prime importance of this, as early recognized by Beard and Mitchell, is not adequately noted. On the basis of the foregoing summary of symptoms the amended definition may be written as follows:—*Neurasthenia is a morbid condition of the nervous system, and its underlying characteristics are excessive weakness, and irritability or languor, with mental depression and weakened attention.*

Diagnosis.—Neurasthenia being regarded as a condition of the nervous system, manifested by functional disorder and without structural changes being as yet demonstrable, and presenting symptoms of so many variable phases, its determination as a disease is peculiarly limited to the method of exclusion. It is not only a direct result of stress and wear on the one hand, but it is so constantly secondary to debilitating influences of all kinds,—the "general debility" of our fathers in medicine,—that it has often to be differen-

tiated as being the remote and not the immediate effect or symptom of some antecedent disease. In other words such a disease may pass away and leave the nervous symptoms to continue as if somewhat by habit. On the other hand, it is the initial condition and often the sole basis of a great variety of symptom-groups, which are framed into pictures of "clinical entities"; it must therefore be differentiated from those disorders of the nervous system in which something has been added to the simple neurasthenia, of graver functional disturbance and perhaps of definite structural change.

Neurasthenia often stands as a middle term between general etiological conditions and nervous disorders. It simplifies and clarifies the view, to regard neurasthenia as the common etiological and initial term to many varieties of symptom-groups, and even of definite nervous diseases, about which there is so much confusion as to their etiology. This is peculiarly true of mental diseases with which we cannot yet get beyond a classification of symptom-groups.

The nutrition of nerve-cells being primarily at fault, toxic influences being always primarily present, central disorder of the nervous system being usually manifested by the earliest symptoms, and cerebral exhaustion through mental strain being one of the most common forms, the diagnosis must often be made solely upon the subjective and mental signs. This may be done early enough for prophylaxis in many cases. Any notable and persistent alteration from the natural manner and appearance, indicating a lowering of the emotional tone, in persons otherwise in apparent good health, suggests inquiry as to the cause of the abatement of natural vivacity and the lack of the usual mental control manifested by unwonted irritability of temper which may be confessed. These premonitory indications are of the most practical value. Active professional and business men who do much brain-work and incline

to sedentary habits, women under a monotonous strain of domestic life or subjected to special mental anxiety and grief, or the indolent who suffer especially from functional disuse and defective elimination, all, at times, are likely to experience these mental signs of "fatigue" and toxicity. The primary order of symptoms being present, and the causes continuing, some of those of the other three orders that have been specified will soon be manifest in some slight degree, and be more or less slowly developed. The study of the genesis of these subjective symptoms and their nature as summed up in the foregoing section, may serve to show how their natural order of development affords a method of analysis that is an aid to diagnosis.

Neurasthenia should first be differentiated from the antecedent conditions, with a discrimination of its immediate and remote causes. This demands a determination, as far as possible, of the nature of the inanition and the auto-intoxication, whether partial or general,—and, otherwise, the study of the "mechanism" of the symptoms. This implies, at the outset, a careful study of all the objective symptoms by the usual methods of diagnosis. Their character as due to neuroses must be established as at least probable, to the exclusion of organic diseases of the nervous system, although these may still have a neurasthenic basis that is amenable to treatment. The inquiry is then led into the central "weakness," the diagnosis of which points out the need of general treatment rather than of medication for the localized disorders. The objective items of the most practical diagnostic importance in this regard are of two classes, and pertain to the elimination of toxic waste products, and to the processes of repair by nutrition and tonic influences.

The way is now clear for a further differentiation of the subjective or mental symptoms to determine the diagnosis and prognosis with respect to melancholia. It must be

remembered that many cases of melancholia have no more than the four orders of symptoms,—no delusions, and no essential impairment of integrity of the reasoning power;—it is a question of degree. On the other hand, very pronounced manifestations of these orders of symptoms, more than in some of the cases of melancholia, will not truly bear that diagnosis, although the underlying organic conditions are of the same nature in both these types of cases. Difficult as it is to draw the line between "nervous prostration" and melancholia, the crucial test may perhaps be best stated as a question of the degree of impairment of the higher power of inhibitory control,—the weakening of the voluntary power exercised through the attention. There may come a time in these conditions when painful ideas become so dominant, because of the inability to inhibit them, as to endanger the patient by promptings to suicide. Then we say, it is melancholia, and that there must be medical restraint. But in many cases the true conditions of melancholia are established before this symptom comes. It is a matter of temperament, education, training, "habits of thought,"—there are those nobler souls who withstand to the last degree the nervous exhaustion, the misery of mental pain, and the terrible temptation to seek relief through "the open door." But many are weak in will and inhibition, and yield early to specious reasoning and the bias of the emotional tone, for whom recovery would be as sure as from other forms of functional weakness. But this bias of emotional tone, which more or less influences all alike, may depend exactly upon those alterations of the "sense of body" which annul the instinctive love of life, thus technically establishing the diagnosis of melancholia. The differential diagnosis of neurasthenia and melancholia, then, depends upon an estimate of the degree of nervous exhaustion with reference to the mental symptoms, particularly as to depression of feeling and weakened inhibition. This estimate

must include a judgment of the individual as to character and of the probable continuance or increase of the alterations in the organic sensations as affecting the natural instinct of self-preservation. Such alterations become the basis of a fifth order of symptoms which complete the symptom-group that constitutes a typical melancholia.

The physical or objective signs do not afford a good differential guide as between neurasthenia and melancholia. The latter may exist without more pronounced symptoms of general debility, disorders of digestion, etc., than are common to neurasthenia, although they are often seen in melancholia, as anæmia, a sub-normal temperature, and a urine which may be scanty and condensed, etc., which suggests special study as to its indications of deficient elimination.

The two special conditions of morning tire and anæsthesia of the sense of fatigue have been described as of the highest diagnostic value in respect to the neurasthenic condition. They do not afford differential indications, however, except that these symptoms are usually more pronounced in melancholia. It should be noted that morning tire is common as a transient symptom after excesses in dissipation or in over-work, but it becomes significant in neurasthenia by its more or less persistent recurrence.

Hypochondria may be differentiated as being subject to the principles just stated in so far as that it is a milder, or a sub-acute, melancholia, in which the patient has peculiar worries over his own bodily ills.

Insistent or fixed ideas may or may not be diagnostic of neurasthenia. They are common in melancholia, mania, etc., in the genesis of delusions, and may continue as sequels of such mental storms through the effects of mental habit and association of ideas, etc. While they are more likely to occur in neurasthenia, and thus become a symptom of it, they are sometimes initiated in persons constitutionally

sound and become the cause of neurasthenia by the worry that may attend them. They may directly initiate it, in fact, as a neurasthenic weakening of inhibition, and in some limited disorder of physiological processes as an association psycho-neurosis. The correct diagnosis of these ideational disorders is important and valuable as affording indications for prognosis and treatment. Hysteria as allied to these affections often has a neurasthenic basis and appears as a complication; and it is peculiarly characterized by the anæsthesias of the special senses.

Treatment.—The diagnosis of the neurasthenic condition having been made, upon a physical and mental examination that for special reasons should be thorough in all particulars, the plan of treatment should be carefully laid out. The objective indications will be first considered.

Elimination of waste products is logically a prime element of the treatment. Not only should the alimentary canal be regularly and thoroughly evacuated, and the work of the kidneys be efficient, but the removal of the accumulations of toxic materials stored up in the tissues should be aided. Constipation from intestinal atony, as a frequent symptom of neurasthenia, will itself directly cause nervous irritability, depression, etc., and the functions of the various organs will be generally impaired. This demands a proper regulation of the bowels; and all means should be tried before regularly resorting to laxatives,—but they must be used if needed. The milder ones, like compound licorice powder, may be used at first, or the compound rhubard or cathartic pills. But a cholagogue purgative has often an excellent effect,—one-sixth grain doses of calomel every hour or half hour,—or five grains of grey powder every hour until action occurs,—or a few doses thus given followed by a saline laxative. A glass of cold or hot water, with perhaps some saline like Carlsbad salts, may be taken at bed-time or in the morning; the hot water especially has

a washing-out effect upon the upper part of the intestinal tract, and acts as a solvent upon the contents of the intestines. Brunton[1] says that many cases of nervous irritability, depression and weakness appear like neurasthenia and hypochondria. Nervine tonics, sedatives, etc., are not needed; but for good results you must treat the bowels. Massage of the abdomen is useful, and small enemata of plain warm water, the rule being observed to solicit action at a certain hour every day. Fruit should be taken freely, and a good proportion of solid food when possible. Minute doses of aloin and strychnia, or one-tenth of a grain of aloin alone, or one or two grains of extract of cascara sagrada,[2] regularly after each meal, have a gentle and excellent effect; the morning doses and later those at noon, may be omitted as the patient improves. But the practical rule must be to give what suits the patient in each case.

Elimination by the kidneys is of the first importance. In cases of neurasthenia it is commonly found that the patients drink too little water, which is the best diluent and diuretic. Prescribe pure spring or distilled waters, which may be aërated,—not too much at meals, but between them or half an hour before; this should be done particularly when the urine is scanty and of high specific gravity. As Brunton says, it "tends to wash away the waste products from the cells of which our organs are composed, to clear out the uric acid, urea, and phosphates through our kidneys and thus prevent renal and vesical calculi, and also to wash out our liver and prevent gall-stones, while it helps to keep the bowels in action." In prescribing the daily consumption of hot water, a slice of lemon in it may overcome the dislike of it. A part of the beneficial effect of milk is doubtless due to increased ingestion of the water it contains, and milk and lime water, or soda-water, may be given to the same

[1] Lancet, June 20, 1891, p. 1365.

[2] This drug will be disappointing if it is not the product of the well-selected and matured plant, and reliably prepared.

effect. Skim milk and whey are good diluents, and best suit some conditions of digestion.

Brunton regards the views of Haig, as to the elimination of uric acid, as an important contribution to our knowledge of the subject. These views have already been quoted, to the effect that the production of an excess of uric acid in the body is due to its deficient elimination in the urine; Haig says also that "it may be looked upon as going on to some extent in every one during the best years of nutrition and bodily activity," tending to its accumulation in the tissues. Uric acidæmia is therefore regarded by him and others as a condition that may ordinarily occur apart from the gouty diathesis, and be a source of much nervous disorder, including the feelings of depression, heaviness, drowsiness after meals, disinclination for bodily and mental exertion, sleeplessness, etc., which are the symptoms common to neurasthenia. The periodical attacks of headache, mental depression, etc., are thus accounted for in young people whose storage is less of uric acid, and the indication for treatment is a change from nitrogenous to farinaceous food. The persistence of these mental symptoms in older people indicates the probable need of clearing out the accumulation of uric acid in the tissues, spleen, liver, etc. The taking of alkalies according to the plan of treatment recommended, and the disorders of nutrition, etc., that increase the alkalinity of the blood, make it a solvent of the stored uric acid; this will cause acidæmia, with a relatively slow, high-tension pulse, and the usually accompanying symptoms. It is greatest after meals and in the morning hours before and after breakfast, during the "alkaline tide" of the blood. Coincident with this is the "morning tire," as has been stated. But if acids are given, wines or condiments containing them, or opium and other drugs that act like them, —as nux vomica, iron, nitro-glycerine, nitrite of amyl,— the uric acid is driven out of the blood into the tissues,

relaxing arterioles by reducing tension, and improving the circulation. Mercury by a like action reduces the excretion of uric acid in urine, producing diuresis. All this is to the temporary relief of the disturbing symptoms, but it is not elimination and they tend to return in a worse degree. If there are exacerbations of headache, with nausea, etc.,—for example, a "bilious attack,"—give aromatic spirits of ammonia or nux vomica in place of acids; or, when acids fail, opium or mercury in small doses will sometimes succeed in affording the temporary relief then essential. Elimination is probably best effected by a course of salicylate of soda, with an acid mixture in alternate doses for weeks or months, till the daily excretion of uric acid remains for some time at the level of normal formation (1–33) as to urea; at the same time there should be as little of nitrogenous food as is compatible with healthy nutrition. The effect is to remove the cause of the irritative vascular disturbance. Then dieting is the main reliance, to limit the formation and retention of uric acid. Haig recognized the fact that when the nervous system is depressed by fatigue, deficient food, etc., disturbance of function will be produced by a smaller amount of uric acid in the blood than at other times. It is significant that these symptoms, common to neurasthenia and melancholia, are often observed in the latter to be ameliorated along with the return of normal excretion by the kidneys. Reference has been made to Brunton's conjecture that oxaluria indicates the presence of some special poison in the blood. Cases with this symptom are commonly treated in the asylums with nitro-muriatic acid; Wood[1] reports some interesting cases of impending melancholia successfully treated in this way. Such considerations give new interest to the physiological processes of elimination, and enlarge a special field for investigation into the causes and treatment of the nutritional disorders of neurasthenia.

[1] Therapeutic Gazette, 1885, p. 793.

The excretory action of the skin should receive attention, and it is promoted by bathing and bodily exercise. The neurasthenic do not bear cold bathing well, and its effect upon those who have previously used it to advantage should be observed. The effects of the warm bath should be noted while it is being taken, and afterwards, so that its temperature and duration may be regulated to suit the patient. Tepid and warm baths at night have a sedative and hypnotic effect also, and may be employed two or three times a week, oftener when well borne. The Turkish bath when judiciously given is useful in some such cases. The morning sponging with cool water, not more than 20° F. below the temperature of the skin, should be regularly practised. It should be given by the nurse until the patient is strong enough not to need assistance,—then the muscular effort is good in addition to the effect of the rubbing with a coarse towel, which should always follow the bath. At first the temperature of the water may be such as to give only a slight sense of coolness, and later it may gradually be made cooler. The patient should never feel cold or weak after the bath; the test of its being beneficial is the sense of warmth and comfort, or invigoration that it gives. The sitz bath and foot bath have their special indications. Sea-bathing on the northern New-England coast is not beneficial to those who are much advanced in neurasthenia; in warmer waters it is often invigorating and useful, and should bear the test of the after-effects.

Menstrual irregularities are often neurasthenic and should be carefully observed and treated, though rarely by drugs. The douche may be used, when indicated, under ordinary rules. Suspension of the flow may be looked upon as conservative. An ordinary flow for the individual is often relatively too much, and should be limited. The patient usually has aggravation of nervous discomfort or severer symptoms at such times, and should be kept in bed from

the beginning of the flow, or the day before, until one or more days after. Fluid extract of ergot has sometimes an excellent effect, in five to ten drop doses, three times daily, for two weeks before the event, or all the month. It regulates as well as diminishes the flow. Large hot douches, twice daily, when it is desired to arrest it after one or two days, have been employed with great advantage. Two to four such douches are usually sufficient.

Nutrition as the main element of the process of repair demands careful attention. All the food should be given that the digestive powers will bear, it being remembered that they are weakened with the other functions. Easily digested articles may be required for a time, but avoid slops if the patient can possibly take solid food. Ignore a little dyspepsia as not always requiring drugs; it will disappear as the patient gains in strength. Milk, fish, eggs, vegetables, fruit in abundance, and farinaceous articles, are the main reliance, noting any special difficulty there be in the digestion of starchy foods.

A variety of plain meats is not contra-indicated, except that nitrogenous articles should be limited in the treatment of uric acidæmia. Haig mentions that Lange successfully treated certain conditions of periodical depression from this cause by a diminution of meat foods, etc.; and Broadbent used the milk diet with success in the frequent association of mental depression with high tension of the pulse. Sugar and starch must sometimes be avoided; give cream, malt, etc., and good butter may be freely used, when increase of weight is indicated; weigh the patient regularly, every month at least. A table-spoonful of malt and the same of whiskey or rum in milk, is a good addition to the light meal that must be taken when there is much acid dyspepsia. One half drachm doses of aromatic spirits of ammonia, at each meal, are useful in this condition.

Give soups, and prescribe water for its value in nutri-

tional processes, as well as a diluent and diuretic. Milk, eggs, good beef tea, porridges of Mellin's Food, with the addition of peptonized beef-powder, etc., afford a variety for luncheons between meals and at bed-time. In the long interval between this and breakfast, especially when the patient is wakeful by night, a glass of milk or the like, and better if warmed, is most useful in anticipation of the morning tire. This significant symptom of neurasthenia is an important index also for general treatment. For this condition give on awaking a glass of warm beef tea, or of milk with a spoonful of whiskey or rum, and it will lessen the "misery." As a rule, however, stimulants should be but little used. In the weaker cases, with much dyspeptic disorder, the regular milk-diet, as much as can be borne, and frequent feeding, may be employed along with the "rest-treatment." At the beginning of the treatment a precise plan of dieting should be written out, with the prescription for each of the fixed hours for meals. Require the nurse, if there is one, to keep an exact record of what is taken, along with the clinical chart and other notes.

Rest, as a prime requisite, should be at first absolute and continuous, or partial. The first is appropriate when there is general exhaustion, or conditions of body that admit of it as an aid in improving the general nutrition for the relief of local neurasthenia. It is contra-indicated in the graver degrees of depression, and especially of irritable restlessness and agitation. Then it must be modified, and some degree of partial rest may be employed. The point is to get as much rest as possible for the patient, until he has acquired some storage of energy, to permit of its use within physiological limits, and to relieve the distressing sensations that are the basis of the lowered emotional tone. Get all the rest possible without increasing the irritation. In some cases the regulation time of six weeks is enough for the absolute rest; sometimes many months of partial rest are

required. There seems to be no rule except careful trial. In the bed-cases the time seems to be indicated by a positive gain in weight and improved quietude of feeling; then it may be necessary that exercise should be urged upon the patient.

Exercise, properly regulated, is essential; it should be begun gently and increased gradually in all cases; in the severer ones the patients may get up first in the afternoon, then after a time in the forenoon, but should be kept in bed till after breakfast for a long time. Get them out of doors daily for fresh air and moderate exercise. This is the plan for partial rest to which cases of pronounced depression and restlessness should be subjected as far as practicable. When the irritability is great, permit them to get up occasionally, to lie on a couch, etc., but promote resting in any way it can be gained. *Exercise should always be kept within the limits of fatigue,—this is the golden rule of neurasthenia.* Macfarlane well says that fatigue invariably intensifies the symptoms, whatever the limit may be; and this must be determined for every individual case.

The guides to the limit of fatigue are most obscure. It has been seen that the feeling of it does not measure it in the well, and that in the weak one of the most important facts in the disorders of the "sense of body" is what may be called anæsthesia of the sense of fatigue. There is no escape from the logic of this condition,—the patient's appreciation of it must always be *interpreted* by the physician, who must also study all the signs of fatigue and *direct* the patient as to the kind and amount of exercise. The effect of this, upon pulse and temperature, for example, should be watched. When the temperature is sub-normal, the conditions of elimination, nutrition and rest should be carefully maintained. Then even a little exercise often seems to increase the irritability; but when the temperature becomes

normal more exercise can usually be borne without this effect, in the more acute stages of neurasthenia. In cases of long standing or partial recovery, of the irritable and ambitious or conscientious type, great depression and a sense of "terrible exhaustion" may follow as a reaction from indiscretion in exercise; this may be prompted by a period of comfort when the sense of fatigue may have been quite reliable as a guide within the narrow limits of much repose and gentle effort, but it is quickly lost under a little stimulation or excitement. Such a patient may astonish and mystify all concerned by extraordinary displays of apparent endurance, but it has to be "paid for" with the repentance that comes with the exhausting reaction that may amount to a true relapse. These effects not being appreciated by the patient as simple signs of fatigue, the "repentance" is quite sure to take the form of renewed and intensified self-reproach, with all its harmful effects.

The careful prescription of exercise is one of the most important duties of the physician in these cases. Within due limits it increases vigor by the law of physiological use. It quickens digestive processes and excites the appetite, and promotes sleep. He must "follow up" his patient and protect him in this particular, until he has acquired a sufficient reserve of energy, and a sufficiently normal "sense of body" to be his own guide. If the physician does not do this he will surely let his patient suffer painful relapses which too often occur in spite of all advice. For patients having cerebral exhaustion, though bodily well nourished, and with effects of sedentary habits, exercise should be coupled with efficient elimination, but it should be remembered that there is also increased central fatigue with all voluntary muscular effort. This must be carefully limited at first, in these as in other cases, while reasonable entertainment is a necessity.

Massage counteracts the tendency to enfeeblement from prolonged rest,—it affords exercise without the expenditure

of energy by the patient,—it promotes the removal of the toxic and waste materials from the tissues, and their healthy nutrition. It must be managed with care and not be too long continued, but may be followed by medical or general gymnastics of the gentler kinds, or other voluntary muscular exertion, to the extent to which the patient bears it without aggravation of the neurasthenic symptoms. Electrical treatment has been much commended both for its sedative and stimulant effects, in the forms of central galvanization or general faradization; the functions generally improve under its tonic influence. It may be employed for a few weeks every other day. It often has a mental effect.

Sleep should be promoted with as little use of hypnotics as possible. They tend to spoil the appetite and to produce secondary effects. Toxic quietude of brain cells may not promote their rest and nutrition. In the diverse causation of neurasthenia the conditions inducing insomnia are varied. Its cause should be determined, in each case, as nearly as possible. There may be some special toxic influence, errors of diet, too much mental work and too little bodily exercise, the rheumatic or gouty diathesis, etc. While the blood tension is usually low in anæmic conditions, it is again high, and a few minute doses of calomel at night with alkalies during the day, are indicated. Sleeplessness from physical over-fatigue, may be relieved by the wet pack, a warm bath, or massage, with some liquid nourishment in moderate quantity,—with a little wine or brandy and a biscuit.[1] If the patient must have something for a hypnotic, do the least harm possible. In such cases Folsom[2] uses preferably an unpleasant drug,—a few minims of paraldehyde in a drachm of chloroform water, and this can be repeated a number of times. This drug is a safe one in drachm doses, when it can be taken; and a second dose

[1] Macfarlane, op. cit., p. 118.

[2] Bost. Med. and Surg. Journal, July 10, 1890, p. 29.

may be given after two or three hours; peppermint water is a good vehicle for it. Sulfonal is, at present, to be regarded as one of the safest hypnotics. Begin with ten or fifteen grains, and when its cumulative effect is gained, reduce it to ten or seven grains; it should be pulverized and given in a moistened spoon, one and a half hours before its effect is expected. Phenacetine, five or ten grains, two or three times daily, is sometimes a good adjuvant when there is nervous distress and restlessness; or it may be repeated every hour, or half hour, till twenty or thirty grains are given, for the relief of pain. Warm baths and night feeding are very effective in the long run. Most patients who lie much in bed can get on with comparatively little sleep. It is better to go without as much as is desired, or wait for it to come, rather than to create a drug habit. Two or three hours each night will do very well for a considerable time in such cases. Beware of using the bromides and chloral continuously. Patients are sometimes brought to the asylums in toxic conditions from these drugs, or from paraldehyde. The first may be given moderately for a short time only,—not more than one week. Iron and other tonics that improve the appetite may be given when well borne. Aromatic spirits of ammonia in half drachm doses may be used frequently and safely in paroxysmal nervousness.

The *subjective* and mental symptoms, in relation to treatment, demand the special attention that their importance in diagnosis indicates. In studying the objective symptoms, a general though brief review was made of the measures ordinarily regarded as therapeutic. This included not only the physical signs, but necessarily also that group of coincident subjective indications of which we can only know by what the patient says of his bodily condition; his appreciation of it may be mainly correct and corroborative of the physician's observatioas, or be interpreted as consistent with them. This includes the *inward* reactions, or *negative*

symptoms of the physical disorder, according to Putnam[1], distinguishing them from the *positive* or objective signs.

But we have seen how the normally correct appreciation of the "sense of body" is qualified in the well; and how with the onset and increase of pathological "fatigue" there is an increasing impairment of appreciation, requiring interpretation by the physician. We have seen also how the impaired and altered "sense of body," and special senses as well, in respect to the group of subjective symptoms just mentioned, affect the strictly mental indications. All can agree as to the symptoms of neurasthenia being mainly subjective; and as to the fundamental facts of irritability and languor in mind and body,—and of mental depression and weakened control. Our study of the mechanism of these alterations of mental activity leads us to see clearly the significance of such effects, and that "the higher mental states are the sensitive indices of the lower physical changes," affording us the truest guides to diagnosis and the need of treatment.

The subjective symptoms, with a correct interpretation of mental states, are the chief guides to diagnosis and treatment. They give the earlier and finer indications, for they always exist when there is neurasthenia; they are often present, and complained of, when there are no clear objective signs. The paramount importance of the mental condition becomes plain because it has to be treated from first to last; there is often no guide but this. Even when all objective signs have for some time disappeared, there can be no assurance of recovery until the patient can say that there is permanent freedom from the depression, irritability, or languor of feeling, and that he has acquired the power to control his own mind, and his natural force is not abated. The most critical periods of the progress towards recovery, when the danger of relapse is greatest, are when the only

[1] J. J. Putnam. Art. Neurasthenia, Ref. Handb. of Med. Sc.

guides to the limits of fatigue are the subjective and mental symptoms,—what the patient feels and thinks as to his own condition. But that itself does not guide,—it is continually leading astray the patient and often the physician. The true guide is to know what it is that makes the patient feel and think as he does. It is upon the correct interpretation of the mental signs that successful treatment largely depends.

A correct knowledge of the working of the mental elements is essential to put the physician into a proper and controlling relation to the case. The very first indication for treatment is that the confidence of the patient should be gained as soon as possible. This is aided by the careful examination, that should always be made, in every particular, bodily and mental, that is needed to establish the diagnosis. It is then important to give the patient a clear understanding of the nature of the malady. Intelligent patients are always very ready to accept correct explanations of their condition and experiences, and it is often most satisfactory to them to know, for example, the reason for the morning tire, and to understand the principle of anæsthesia of the sense of fatigue. They know what it is to be too tired to feel fatigued. The first thing is, therefore, to know what is the matter, and then to get the patient to know it; this gains the willing and intelligent coöperation of the invalid,—relieves greatly the worry,—and thus directly promotes repose and the arrest of exhausting processes both in body and mind. All writers agree as to the importance of gaining such coöperation, and advise careful attention to this part of the treatment of such cases.

When the physician thus appeals to the understanding and interest of his patient, he addresses himself exactly to the moulding of the mental elements that are involved in the malady,—he sets himself, at the outset, to treat the symptoms that all observers note as among the earliest to appear.

The first clinical procedure, then, with which the treatment is begun, is to get the whole story of the patient's experiences with reference to the symptoms, as soon as practicable. When neurasthenic patients come to the physician, they have usually made a number of attempts at "resting," and have suffered as many relapses because the golden rule of keeping within the limits of fatigue was not followed to the completion of convalescence. The patient comes because he has begun to think that something serious is the matter, and that because recovery does not come it may never come.

The treatment of neurasthenia, with respect to the indications given by the mental elements, resolves itself into procedures suited to two general groups of indications. These may be broadly distinguished as the *first-effects* and the *after-effects* of the neurasthenic condition. Among the first-effects, or those attendant upon the active operation of the neurasthenic influences, are the direct and immediate results of excessive expenditure of energy, deficient repair, toxic effects, etc.; these may represent the formative stages of the supposed "molecular or chemical variation" that is manifested as "an exhausted or changed nutritional power." Among the after-effects these changed conditions become more pronounced; the expenditure of energy may be greatly lessened, but it is limited by its relation to weakened assimilation; the toxic elements may have been largely eliminated, though some of their effects remain; the condition is more strictly one of "irritable weakness," and all the secondary effects of morbid habit and association are in full force. The neurasthenic condition as modified by after-effects presents a materially different problem as to mental treatment.

In the early and active stage of neurasthenia, the problem is a relatively simple one for the analysis and interpretation of the mental symptoms as a guide to treatment. The his-

tory of the case should make it easy to distinguish the four orders of the subjective symptoms, and to trace their development. Take for example the case of the physician whose account of it was quoted, in a previous page, from his letter. At the closing of a busy year, while still doing very active work, he felt that it required greater effort; he could not help worrying unduly; there were threatenings of the sciatica to which he had been most subject at that time in the year, and he sometimes felt considerably fatigued. After three weeks of greatly lessened work, the four orders of symptoms were more plainly revealed; there was (1) "a letting down of spirits;" (2) lessened control over his worry; (3) the worry was consequently increased, and there was (4) an altered "sense of body," shown in nervous irritability and languor, and excessive sense of fatigue. The condition being further interpreted, there was more real "fatigue," but it was concealed by a fatigue-anæsthesia when he was still active, than later when he felt it more keenly after partial rest. In other words, he was really better when he felt worse, — he was recovering his sense of fatigue. This was proved by the sequel: in the fourth week, with no change in affairs, etc., and no treatment other than the comparative rest, he was quite well, was changed in appearance, had recovered his cheerfulness, and began his summer vacation with better zest than for a long time before.

In another case, a lady engaged in clerical work had for three months an increasing tendency to aching and a sense of pressure in the head, and to waking early in the morning; she would not confess to morning "tire," but said she felt "worse" then; she worried, felt the need of greater effort to begin her daily task, but "*could work faster*" than before, and being conscious of not feeling well, she expected a short vacation to restore her strength. On returning to duty, the work seemed very difficult and not half done on

the first day, and impossible the next, from weakened mental control; the insomnia, worry, etc., greatly increased, and a prolonged rest with careful treatment had to be ordered. She knew she was "running down," by failing appetite and loss of weight. Otherwise, there was little in either of these persons besides the subjective symptoms to call attention to the neurasthenic condition; neither was it appreciated by them until there was lessened stimulation by work to be done. The four orders of symptoms were plainly shown in the last case; their earlier recognition would have clearly guided treatment obviously necessary to have saved the patient from so dangerous an approach to a serious mental breakdown. This applies particularly to the fourth order of symptoms, — to the fatigue-anæsthesia, and the deceptive facility from irritable weakness, that enabled the patient to "work faster," thus increasing her danger. In the more advanced cases, the mental indications, as first effects, are clearer, and their analysis easier. Their value as guides to treatment is more readily apparent, pointing to their origin in organic inanition and auto-intoxication as the double cause of the "fatigue."

The after-effects of the neurasthenic condition present modifying indications that have to be met in the plan of treatment. These are seen in the later stages, either in convalescence or chronicity. The significance of the symptoms, in this regard, has been pointed out. For example, one who has regained some reserve of nervous energy, and maintains a fair degree of comfort when effort is kept within his limits of fatigue, may be prompted by desire, or a sense of duty, to over-exertion. The undue quickness of response to the stimulation of interest and attention is to be recognized as an evidence of the irritability of unstable weakness. The apparent ease and zest of the effort is not due to real power, but there is a speedy blunting of the sense of fatigue. The reaction of exhaustion and mental misery that come as after-

effects are not to be interpreted as the patient feels and thinks, but as precise manifestations of—(1) changed organic sensations shown in a lower emotional tone and "hopelessness,"—(2) the decrease of the mental power of control in weakened attention,—(3) worry, self-reproach, and apprehension as simply signs of a relapse of the "fatigue," the limits of which were exceeded in breaking the rule of treatment. The fundamental weakness is shown, from the beginning of the event, in (4) the susceptibility to stimulation and quickly changed sensations, followed by increased exhaustion and irritability.

Such an analysis of a later stage of neurasthenia reveals the four orders of symptoms as we may observe them in a case under proper treatment, in which there may be a measurably effective elimination, but defective assimilation still remaining, and therefore prolonged inanition. The irritable weakness is more characteristic, and the indications for treatment are all the more significant. The whole matter comes, in fine, to this:—the condition is one of deficiency of nervous energy,—the problem is to effect a re-storage of that energy. It is a part of the process that the power to do things can only be maintained or regained by the doing of them,—by the law of use and disuse. But the patient must always be "kept within the limits of fatigue" during treatment, through convalescence, to established recovery.

In these later conditions the advantage of intelligent co-operation on the part of the patient becomes more evident. It is a part of the treatment, therefore, that the patient should be taught to make a correct interpretation of his symptoms; he will thus become an aid to the physician, and learn finally to be his own guide as to the limitation of effort. One cannot "go by feeling" whose power to feel is itself disordered, and this lesson once learned has a therapeutic value by leading the patient to "go by judg-

ment." But it is precisely because of weakened attention and morbidly intensified feeling, that the better and often accepted judgment cannot be held. Here comes in one of the chief duties of the physician with respect to the patient's mental condition. It has been seen that his "exercise" must be followed and guided with persistent care. As the changes in bodily conditions are best revealed by the mental indications, these should be followed with sufficiently close observation, and encouraging counsel, to enable the patient to hold to the way of recovery and to faith in the necessary means. It is a part of the physician's business to repeatedly uplift his patient by explaining the newly arising worries, and directing as to diet and exercise. If he is left to himself too early in regard to all these matters, relapses are very sure to come through inability to interpret correctly the altered sensations and the fallacious appearances of returning strength.

The foregoing considerations apply particularly to the large class of patients that have to be systematically "held back" in all stages of the neurasthenic conditions. The opposite class of cases has been mentioned that require urging to effort, when the proper time comes. Here is revealed more plainly another modification, as an after-effect, that always introduces great difficulty into the treatment. It is the effect of the laws of use and disuse,—of practice, habit, and association. The long continuance of disordered activity has created a "functional disposition to repeat organic processes" in a morbid way, and it has been shown how this involves a like association of morbid ideas and feelings.

The "functional disposition" may work to good or bad results. In either case the principle is the same,—the law of use and practice rules. To overcome a harmful "disposition" to repeat organic and mental processes is exactly to re-acquire good habits by the practice of them. Hence it is

that the power to do things comes by doing them, and by gradually gaining the effects of practice. Small beginnings are necessary in these cases of neurasthenia. It is the persistence of repetition that is efficient. In the condition of first-effects there is lack of power, and it is plain that there is no place for heroic methods of breaking up morbid "dispositions" and habits. More harm than good is likely to be done by dominating methods unless based upon a clear insight. But forceful measures may sometimes be wisely used; it is only when power is sufficiently restored that such measures are justifiable as against morbid habit in the "after-effects." Confidence gained, and the truth made plain, are the best helps. In the peculiar cases requiring it the best way is for the physician to suggest in advance the new effort to be made, "not now, but by and by," when the patient is going to be ready for it. He becomes familiar with the idea, and when the time comes the expected effort is successfully made. This is leading along by holding back; such patients are afraid of being "pushed," they have usually, in the earlier stages of the malady, made mistakes in "pushing" themselves or by having it done by others. The patient's mind should always be prepared in advance for changes. Much is gained by giving the confident expectation of recovery. This is one of the best remedies of all, and it can be truthfully applied because most cases of true neurasthenia should get well.

The rule has been laid down that "exercises hould always be kept within the limits of fatigue," and we know that the guides to those limits are most obscure. It is equally the responsible task of the physician not to overdo his duty, in the cases that have to be held back, and in those that have to be urged to effort. It is precisely in the extreme cases of the latter class,—what Mitchell would call the "vampyre" type,—that the greatest discretion must be used. Such patients are often the victims of morbid association-habit and

a self-indulging egoism; under the spur of a seemingly perverse interest, they will sometimes make unwonted and extraordinary effort. We must realize that this may be done without a concurrent sense of fatigue, which may come later in a real and most painful way. Then the patient has a new argument to sustain her self-deception that all effort is bad; and even the physician is sometimes put at fault if his heroic measures are not successful. There is need of sympathetic helpfulness even here.

We often ask ourselves, in all cases requiring enforced effort, what are the "limits of fatigue"? It is perhaps the clearest guide in such cases that "exercise" may be pressed with safety while the fatigue of it is *felt*, even sometimes to the degree of painful *tire*. To avoid "fatigue" is to keep within the limits of *pathological* fatigue, which gives due warning by the signs of fatigue-anæsthesia. This rule applies as well to the graver cases of neurasthenia presenting mental symptoms, when the progress upward toward recovery reaches the degree where normal fatigue is felt. In such cases, after the symptom has been left behind that technically differentiates melancholia, it is neurasthenia the rest of the way to health.

A change from the usual surroundings often does great good. The breaking up of painful associations, on the principle of "out of sight, out of mind," always holds good to some degree. Even homesickness is often salutary,—it is a natural and wholesome "worry" that works to advantage when it displaces a morbid worry. Dependence upon devoted and sometimes over-sympathetic relatives is likely to endanger the formation of degenerative habits in long and severe cases.

It has often been said that the very first requisite for successful treatment is to gain the confidence of the patient; this recognizes the leading importance of the mental element. It is a part of this requisite, however, that the

physician should first earn the confidence he seeks to gain. It is the *interest* the patient has in the means for cure that is the most helpful motive; and we have seen what control a feeling of interest has over the attention. But the patient's interest is very exactly measured by what he feels is the physician's interest. This means sympathy,—for that and such interest are one. The physician's sympathy must be genuine,—no one more quickly than such a patient detects a false tone in it. No one more readily sees the fitness of good explanations. But the way to true sympathy is plain,—it springs from knowledge. The physician should first know his case,—then all that is needful follows. No good physician, who acquaints himself with the marvellous simplicity that underlies and rules the elements of his patient's suffering, and thus sees the way to cure, but must be keenly alive to the worthiness of the most skilful efforts. The patient's interest will then take care of itself,—his attention is held through motive interest. In mental matters all this is strictly physiological, which Bucknill says is true of all that is meant by "moral treatment."

Conclusion.—The purpose of this study of neurasthenia is to contribute something in the search for the philosophy of its treatment. To make this philosophy practical, it must be drawn down to plain terms. We have seen that the central fundamental fact is nervous weakness, manifested primarily in two ways:—(1) by an exactly parallel weakness of mental inhibitory control through voluntary attention, and (2) by the central motive element of a lowered emotional tone, from a sense of ill-being. The first of these indications may be concealed, even from the patient himself, by intensified interest and increase of effort; the second he *feels* and soon betrays.

The complex accessory conditions of changes in the sensations,—irritability and hyperæsthesia, languor and anæsthesia, and their causes,—have been explained. These are

manifested a little later than the primary mental effects. The prime indices of the neurasthenic condition, therefore, are weakened mental control and a painfully intensified motive element. It is this central emotional tone, determining *interest*, that has the sway; this is our point of attack. There are two ways of approach to it: (1) through the body, restoring its strength and well-being,—mental comfort and control follow; (2) through attracted attention and suggested ideas we reach the emotional tone,—healthful feeling and interest attend upon wholesome ideas.

While the patient is in the condition of first-effects, as long as the causes of bodily ill-feeling persist, we can only palliate, or prevent increase of trouble,—only transient effects are produced by influencing the emotional tone in the second way. Here the chief aim is physical restoration; this being soon accomplished, all is well. We prescribe rest and urge nutrition; this means also elimination. But in the condition of after-effects, the problem is changed. The toxicity of true neurasthenia being removed, and that of special diatheses, as of uric acid, being controlled, we have to deal with inanition from cell inaction, and the effects of habit. The patient finds it easiest and most *interesting* to attend to the habitual association of morbid ideas and feelings. The body in repose is then comparatively comfortable, while there is only a weak tolerance of a little effort and toxicity; the way to the motive element for the stimulation of healthful *interest* is through ideas. But effort is painful, the will is weak, habit is strong. Hence we instruct our patient how to understand his contradictory symptoms; we introduce corrective factors into his mental equations, raise or reduce others to their true powers, and eliminate the constants of error. Then we prescribe exercise, urge practice within the limits of fatigue, and maintain elimination and nutrition. By physiological use, the will recovers its power, exercise promotes assimilation and elimination, and increased vigor; effort

becomes easy, wholesome interests revive, and the emotional tone is one of ease and comfort.

The maintenance of a sense of well-being, under reasonable effort of body and mind, is the sign of obedience to the rule that "exercise should always be kept within the limits of fatigue." Normal fatigue is simply wholesome *tire*,—then rest is welcome and is followed by immediate comfort. Pathological fatigue is attended by fatigue-anæsthesia, and this marks the beginning of danger. We find our natural safeguard against that danger in observing the mental effects that quickly manifest their close relation to normal fatigue and its toxic products. But we have seen that when wholesome tire passes over into pathological fatigue, there comes over-tire not only to the central and motor, but to the sensory, elements of the mechanism. The recognition of the mental effects of the changes in the "sense of body" is our constant guide to prophylaxis and treatment,—for both of these uses the golden rule is that exercise should always be kept within the limits of *pathological* fatigue. Fatigue-anæsthesia betrays us into its toils,—it is a danger-signal if we recognize its significance. It becomes conspicuous by the absence of normal fatigue when there is the presence of *other* signs,—the first of these are the mental effects of fatigue. This teaches us the precise and saving significance of all these mental signs.

In these considerations lies the proof of the proposition with which the discussion was begun:—neurasthenia, for a guide to its prophylaxis and treatment, makes itself known to us mainly through the significance of its mental symptoms.

ARTICLE XI.

A CASE OF NEPHRECTOMY FOR INJURY OF THE KIDNEY.

By HOMER GAGE, M.D.
OF WORCESTER.

READ JUNE 10, 1891.

A CASE OF NEPHRECTOMY FOR INJURY OF THE KIDNEY.

Mr. Benjamin Bell, after a very careful description of injuries to the kidney, their dangers and possible complications, dismisses the question of their surgical treatment with these words: "All that art can with propriety attempt is to prevent the urine from lodging." This was in 1791, and until within a few years art has not attempted to do more. The number of instances in which operative interference has been resorted to for the relief of wounds and injuries of the kidney is still so small, as to make each new experience worth recording, and to justify us in considering very briefly when and how such interference may best be employed.

The subject of the following case was a girl 12 years old, who entered my service at the Worcester City Hospital, Oct. 18, 1890. She had always been strong and well, was well nourished, and well developed. It was said that six days before, while stooping over to pick something from the floor, a small pair of shears fell from a height of about seven feet, striking her in the back. They penetrated her clothing and entered the right loin, but, upon raising herself into an erect position, they were dislodged and fell to the floor. Subsequent developments made it altogether probable that they were impelled by a stronger force than that described, but I was never able to obtain any different account of the accident. She was seen soon afterward by Dr. J. H. Kelley of this city, who found a penetrating wound about one inch long just below the 12th rib, about an inch and a

half to the right of the vertebral column. There was no evidence of shock, and but very little external hæmorrhage. After cleansing the wound he closed it with a superficial stitch, and primary union had already taken place at the time of her admission to the hospital. On the evening of the accident the urine became very bloody, with numerous clots, one apparently a perfect cast of the ureter. On the following day the urine was clear again, but on the second day the hæmaturia re-appeared, and had continued without intermission up to the time when I saw her.

She was then quite anæmic, had a temperature of 102.6°, pulse of 110—complained of pain in the right lumbar region, radiating downward along the course of the right ureter. This pain was somewhat increased upon pressure, but no fulness or increased resistance was discoverable by palpation. The urine was very bloody, with large clots, some resembling casts of the ureter. Microscopic examination of the sediment revealed, beyond the presence of blood, nothing abnormal. The act of micturition was very much increased in frequency, and associated with very marked tenesmus. Sometimes she could not pass water until after a clot had been pulled out of the urethra with forceps, or dislodged by irrigation. During the next week her temperature ranged from 100° to 102.5°, while her pulse maintained its strength at 110. She slept poorly, and had no appetite. The 24 hour amount of urine was approximately 16 ounces, and contained a great deal of bright red blood. The pain was referred chiefly to the bladder. Up to the 25th of October it had been impossible to note any difference in the loins, but on that morning a semi-fluctuating tumor the size of a small flattened horse chestnut could be felt just below and outside the scar of the original wound. The pain in her side was increased, while the urine became perfectly clear. It remained clear for two days, when she had a smart hæmorrhage from the bladder, with coincident

disappearance of the tumor in the back. Her pulse had risen to 120, and her temperature ranged from 99° to 102°. Convinced that extravasation into the perinephritic area had already taken place, that the hæmorrhage proceeded from some large branch of the renal artery, and that further delay would only add to the dangers of an operation which must sooner or later become imperative, I decided to operate on the 28th of October, 16 days after the reception of the injury.

A vertical incision was made on the right side from just below the outer end of the 12th rib downwards to about three-fourths inch above, and just behind the centre of the iliac crest, curving forward from here on to the abdomen to a point in the line of the anterior superior spine of the ilium. The quadratus muscle was drawn to one side and the dissection prosecuted through the perinephritic tissue. The latter had become so infiltrated with organized blood clot that it resembled a cut section of the liver. Retained immediately about the kidney were two or three ounces of dark bloody pus of a decidedly urinous odor. On the posterior surface of the exposed kidney, corresponding in position to the original wound in the skin, was a ragged incised wound about ½ inch long, the edges of which had not united. The ureter was found very much distended, filled with clot, and its walls were so thin that it resembled, and was at first mistaken for, a large vein. It was cut after being secured by a strong silk ligature. A single silk ligature was then passed around vein and artery together. A transverse incision was made into the kidney to make sure that the vessels had been secured, and it was then removed in two sections, first, the upper one-third, then the lower two-thirds. There was no hæmorrhage—the wound was thoroughly irrigated with bichloride, then with hot water, and a large drainage tube inserted. It was closed with interrupted silk sutures, and an antiseptic dressing was applied.

At the end of the operation the patient was in a condition of profound shock with a very rapid fluttering pulse. Upon being placed in bed and surrounded with heaters she rallied quickly, and the pulse became clear and distinct at 164. There was no vomiting, and under the free administration of digitalis and stimulants the pulse had fallen by evening to 140, of good strength. She passed urine involuntarily twice during the night, but slept well, and from that time forward her convalescence was uninterrupted. Her temperature was 102.2° on the night of the operation, and 101.6° on the following night. It never afterward rose above 101°. The amount of urine passed during the first 24 hours could not be measured because of the two involuntary discharges, but in the second 24 hours it was 14 ounces, and during the succeeding week it maintained a daily average of 15 ounces. Two weeks later it had risen to between 18 and 20 ounces. The stitches were taken out on the fifth day, the tube on the sixth, and on the ninth day she sat up in a wheel chair. The wound was healed except along the track of the drainage tube, from which there was a slight sero-purulent discharge. At the time of the operation she received a severe burn on the sole of the foot, which kept her from walking for a long time, and was the source of much more pain and discomfort to her than the removal of her kidney. On the 9th of December, less than six weeks after the operation, she left the hospital—both wounds healed.

Since her discharge she has grown taller and stouter, has enjoyed excellent health, and attended school regularly. About four weeks ago the track of the tube re-opened and one of the silk ligatures came away; the sinus still discharges a very little occasionally, and I presume the other ligature will follow.

Examination of the kidney after removal showed that the blade of the shears had entered its posterior surface near the

junction of the lower and middle thirds, midway between the outer and inner borders. Passing downwards and inwards, it had crossed the pelvis of the kidney, severed a large branch of the renal artery, and emerged through the capsule on the opposite side. The wound showed no attempt at healing. The plugging of the ureter by clots caused the extravasation of blood and urine through the wound into the perinephritic cellular tissue, while the urine passed from the bladder came from the uninjured kidney and was perfectly clear. The discharge of the clot allowed the extravasated blood to drain back into the pelvis, and led to the collapse of the tumor as noted on the day before operation. One of the most striking features of this case was the entire absence of shock following so severe an injury to the kidney. To be sure there was no complicating wound of the peritoneum or of other viscera, and the hæmorrhage took place very slowly, still its absence is noteworthy, and suggests, I think, at least as probable, that a simple incision of the kidney will ordinarily produce no constitutional disturbance if the large vessels are carefully avoided.

Accidental wounds and injuries of the kidney are by no means so dangerous as was formerly supposed. Of the 80 cases of gun shot wounds recorded in the Surgical History of the War of the Rebellion, all treated expectantly, one-third recovered, and a large majority of the 54 fatal cases were complicated by serious injuries to other viscera. The results of subcutaneous rupture and laceration are even more favorable. In the same history are reported five cases of this nature, with three deaths and two recoveries. To these we may add the 71 cases reported by Maas and the 27 cases of Otis, making a total of 103 cases, with 50 recoveries and 53 deaths. Of the fatal cases 20 may fairly be attributed to injuries of other organs, leaving the mortality from uncomplicated subcutaneous wounds of the kidney at 33%. Gravitz, from a consideration of 108 cases, including

most of those just alluded to, places the mortality in uncomplicated cases at 35%. It follows therefore that about two-thirds of the uncomplicated cases recover, under the expectant plan of treatment. Punctured and incised wounds speedily become subcutaneous, as in the case just reported, by the closure of the wound in the skin, and present no additional dangers. The natural tendency to recovery in so large a proportion of cases makes the presumption decidedly in favor of a policy of non-interference. More radical measures are to be undertaken only in the presence of clear and strong indications. It is of course difficult to determine when interference is really demanded, and when rest, opiates and cold applications are likely to be sufficient.

A consideration of the fatal cases above mentioned shows that whenever the patient has survived the immediate shock of the accident, death has almost always resulted from hæmorrhage, or from septic infection. If the peritoneum remains intact, the extravasation of blood and urine takes place into the perinephritic and subperitoneal tissues. If the peritoneum is torn, extravasation takes place into the abdominal cavity with, even if the hæmorrhage is inconsiderable, the development of a rapidly fatal septic peritonitis. Of 47 cases in which the cause of death is stated, excluding deaths from primary shock, 23, or 48%, were the result of sepsis, and 15, or 32%, the result of hæmorrhage, *i.e.* 80% of all cases. Suppression rarely occurs unless both kidneys are injured or only one exists. Deaths from shock and suppression are unavoidable. Those from hæmorrhage and sepsis are at least in some measure controllable. The difficulty is to know when and how.

In general we may say that surgical interference should be limited to those cases in which one, or both, of these dangers already exists; or may reasonably be expected. Whenever the loss of blood, whether from an external wound, or per urethram, is so great as to threaten the life of

the patient, resort must be immediately had to operative interference. A blanched countenance, rapid pulse, and threatened collapse, indicative of internal or concealed hæmorrhage, demand equally prompt action. If the wound is subcutaneous, the only other danger would be from extravasation of urine. If this has taken place into the abdominal cavity, it will be speedily followed by the symptoms of perforative peritonitis—abdominal pain, tenderness, distension with tympanitis, vomiting, and profound prostration. Operation would then always be indicated. If, on the other hand, the peritoneum is not ruptured, and extravasation takes place into the cellular tissue about the kidney, an increasing sense of fulness and tenderness in the lumbar region, with beginning signs of constitutional disturbance, make further delay dangerous and unsurgical. If, instead of being subcutaneous, the wound is of the penetrating sort, we have the same condition of things according as the abdominal cavity is, or is not, opened, and besides the possibility of infective material having been introduced from without. The indications for operative interference just given will still hold good with the following addition. A wound inflicted from the front or side, and injuring the kidney, must in all probability have passed into and through the peritoneal cavity; it ought, therefore, to be thoroughly explored, and the protection of the peritoneal cavity secured. Active interference is also necessary in those cases where urine escapes from a wound inflicted from behind, and not opening the abdominal cavity.

How shall we interfere? There are several methods of procedure: viz., simply a free lumbar incision with drainage, the same incision carried down to, or into, the kidney, with drainage or packing for the relief of hæmorrhage, *i.e.* nephrotomy—dissection in the same region carried still further, and the kidney removed, *i.e.* lumbar nephrectomy—or lastly, laparotomy, exploration of the peritoneal cavity

and removal of the kidney through an incision in the meso-colon, *i.e.* abdominal nephrectomy. As illustrating the results of these methods, allow me to call your attention to the tables derived from Willard's article in the Transactions of the American Surgical Association, and from Newman's recent work on Surgical Diseases of the Kidney. There are in all sixteen cases. Of primary operations there are three abdominal nephrectomies, all for gunshot wounds, with one recovery and two deaths; three nephrectomies for knife wounds, all of which recovered, and three for rupture, with two recoveries and one death,—these six through a lumbar incision; two primary nephrotomies, both for rupture, and both successful. There were four secondary lumbar nephrectomies for rupture, with three recoveries and one death, and one similar successful operation for prolapse of the kidney through a lacerated lumbar wound. Of the two deaths from the abdominal operation, one took place on the 15th day from gangrene of the intestine, which had been wounded by the bullet, and the other on the 4th day from shock and hæmorrhage, the renal vein and artery having both been severed. The death from primary lumbar nephrectomy was from sepsis, that from the secondary operation was due to shock.

In 1885, Dr. S. W. Gross compiled the statistics from two hundred and thirty-three cases of extirpation of the kidney for disease, and found that the mortality by the lumbar incision was about 37%, while that by the abdominal was about 51%. The results obtained from operations for traumatic lesions do not diminish the advantages of the lumbar incision. Except when especially indicated the abdominal should never be the operation of choice. It is to be preferred, I think, whenever the track of the original injury appears to lead through, or into, the peritoneal cavity, and would, therefore, be selected in all cases where the wound was inflicted from the front or side of the body, and when-

ever there was reason to suspect an extravasation of blood or urine into the peritoneal cavity. Shall the incision be made in the median line or in the linea semilunaris? The kidney must be reached by cutting through the parietal reflexion of the mesocolon, and this lies almost directly under the outer edge of the rectus muscle. Even here the opening in the abdominal wall must be at least four or five inches long—if in the median line it must be much longer, with a consequently increased exposure of the abdominal contents and the additional risk of a more difficult manipulation. Whenever possible the opening in the mesocolon should be closed, and in all cases I would drain from behind. Under all other circumstances in which operative interference is indicated, the kidney is to be reached from the loin. Various incisions have been proposed, and each has its advantage in individual cases. The nature and location of the wound will generally determine the surgeon's choice, as it will the extent of his operation. If there is no escape of urine through the wound, packing with iodoform gauze will control the hæmorrhage, and this, with efficient drainage, will probably be enough. If urine is escaping through the wound, one must decide between primary extirpation and the secondary operation for the relief of the fistula, which will probably result. Other things being equal, secondary extirpation is the more favorable operation. One's judgment as to the ability of the patient to withstand the additional shock of the operation must be weighed against the chances of adhesions being formed, and a more formidable though secondary operation made necessary. If the kidney is prolapsed through the wound, it may, if uninjured, be replaced, and secured by sutures through the capsule as in nephroraphy for movable kidney; if injured, it is better to remove it at once.

ARTICLE XII.

DISTURBANCES WHICH MAY FOLLOW INSTRUMENTATION UPON THE MALE URETHRA AND BLADDER.

By PAUL THORNDIKE, M.D.
OF BOSTON.

READ JUNE 10, 1891.

NOTES ON THE DISTURBANCES WHICH MAY FOLLOW INSTRUMENTATION UPON THE MALE URETHRA AND BLADDER.

For nearly one hundred years it has been a well-recognized fact that a certain amount of constitutional disturbance is apt to follow the introduction of an instrument into the male urethra. This disturbance, varying as it does in intensity, and manifesting itself by different sets of symptoms in different cases, has received a variety of different names and has been the subject of much speculation and of a great deal of painstaking investigation. Under the names catheter chill, catheter fever, urethral fever and urinary fever, various conditions have been described, various classifications of these conditions have been made, and various different ideas as to the causation of the disturbance have been advanced.

In this way there has naturally arisen considerable confusion as to what clinical condition is meant when one or the other of these various terms is employed.

It has seemed to the writer that this confusion was largely a verbal one, and that the conclusions reached by various observers agreed in reality very well.

It is the object of these notes merely to make a simple classification of the different conditions as they exist clinically, and to speak briefly of each one.

Looking at the matter then purely from its clinical aspect we find that all cases can readily be grouped under a few headings.

XUM

I. *Cases of "Shock."*—We are all familiar with the condition which is commonly spoken of as "catheter chill." After instrumentation upon urethra or bladder, especially if it be the patient's first experience of the sort, he becomes faint and may completely lose consciousness, or he is seized with one or more short rigors. This attack is accompanied by little or no fever, passes off in a few moments, and is as a rule followed by no bad result of any kind. The attack then comes directly or very shortly after the passage of the instrument, is of short duration and is followed by little if any constitutional disturbance. The attack is also more likely to occur and to occur with greater violence, the deeper into the urethra the instrument is passed.

Of this form of disturbance but little need to be said. It is clearly a case of nervous shock occurring in a healthy person. That is to say, the rigor is a physiological one, produced by the local irritation of the instrument, and following more or less immediately upon its passage. The attack may take the form of a fainting spell or of a chill; but it is not followed by any symptom or group of symptoms indicating septic infection. It is the simplest form of shock following mechanical irritation of the urethra or bladder.

There is, however, a severer form of shock which is fortunately much rarer. Mr. Banks, in an admirable article in the Edinburgh Medical Journal for 1871, reports several such cases, and among others the following which will serve as a type of this class of cases.

A man, 40–50 years of age, was admitted to the Liverpool Royal Infirmary for urethral obstruction. A false passage was found, but a catheter (6-7 English) was passed into the bladder without any undue violence. There was very little pain, no bleeding, and nothing to indicate any lesion of the urethra other than the pre-existing false passage. Almost immediately after the entrance of the

catheter into the bladder, the patient was seized with a severe rigor. The instrument was cautiously withdrawn, but the patient became profoundly collapsed and died in a few moments. In this case no autopsy was allowed, but there are recorded many such cases where the autopsy showed no lesion to account for the fatal issue. More or less advanced renal disease is, however, found at the autopsy in these cases. This then is an example of the severest form of urethral shock.

There may be various other symptoms associated with the collapse in different cases, *e. g.* vomiting, diarrhœa, retention or suppression of urine; but they are all cases of this type. That is, they are all sharp attacks coming on immediately or very shortly after instrumentation, and the fatal result comes rarely later than forty-eight hours from the beginning of the attack. There may be little or no fever, and the attack begins so soon after its cause that there has been no time for any septic absorption to take place.

Again, in those cases where there has been suppression of urine, death takes place so quickly that it cannot by any possibility be attributed to uræmia following the suppression. The cases are cases of shock pure and simple.

II. *Cases of Acute Fever.*—We come next to a class of cases having little or nothing to do with the class already spoken of, and yet concerning the nature of which the greatest differences of opinion exist. I mean the acute febrile cases, the commonest form of urinary fever and the type of case we see most frequently, and often speak of as a case of "catheter fever."

That these cases may have certain symptoms in common with the class of cases mentioned above, is certainly true, and it is apparently for this reason that some writers have called them cases of shock; others, cases due to uræmia; while still others mention malaria as the causative element.

A typical case of this class would be the following: —

A patient in good general condition is examined for stricture, and a bougie or steel sound passed with little or no difficulty. After several hours, and generally shortly after the first urination following the passage of the instrument, the patient experiences a distinct chill. He looks badly, has an anxious expression and begins to complain of pains in back and head. Temperature rises and there may be vomiting and retention of urine. Temperature goes higher, thirst becomes marked. This febrile attack lasts a few hours and gives way to a period of sweating, after which the patient is left in an exhausted condition; the fever leaves him, as a rule, inside of twenty-four hours, and on the next day he has well-nigh recovered his usual good health. This usually ends the trouble, but this attack may recur one or more times without fresh provocation of any sort.

This recurrence, with no further instrumentation or other assignable cause, would of course suggest further trouble of a serious nature; but attacks of this sort may go on for some weeks with many recurrences, and yet end in recovery. Sir Henry Thompson, in speaking of these recurrences, says: "And sometimes the reason for the recurrence is not very obvious; thus, if no cystitis appears or if a pre-existing slight attack is not intensified, suspicion may arise as to the presence of inflammation in the ureter or pelvis of the kidney of either side, to be sought for by examination for local tenderness, etc. And when there is no such affection and no renal implication or other cause, — septicæmic infection for example, — discoverable, the recurring attacks will probably soon diminish and disappear." Can such an acute febrile attack be caused by nervous shock? If so, the attack should follow immediately upon its cause, and should be the greater in proportion as its cause is more severe and prolonged. This is not the case, for the fever

does not occur for several hours after the instrumentation, but comes most commonly a short time (1–4 hours) after the first micturition following the use of the instrument. It is also quite apt to follow a simple, easily-performed catheterization. Then, too, if due to shock, we should not expect any prophylactic after-treatment to prevent the attacks after urethral operations. Yet it would seem that when steps are taken to prevent contact of urine with the wound, after internal urethrotomy for example, nearly all the cases escape with no disturbance whatever. It is also well known to surgeons that these attacks are comparatively rare after an external perineal urethrotomy or lithotomy where proper bladder drainage is secured. It is also found that the position of the wound in operations upon the urethra has a direct influence upon the appearance of these symptoms.

Mr. Reginald Harrison says, "We find such symptoms more frequently follow when the wound is made on the floor of the urethra in preference to the roof. A dependent position of the wound is more likely to be associated with the fever than one not so situated."

Mr. Harrison adopted the theory that these febrile attacks after urethral operations were due to poisonous material of some sort furnished by the urine, and absorbed through the wound made by the operation. He performed a number of operations with the idea of keeping the urethral wound entirely free from contact with urine, either fresh or decomposed. To accomplish this end, he performed an internal urethrotomy on each of a series of cases of anterior stricture, and then secured absolute and perfect drainage by doing an external perineal urethrotomy as well in each case. In this way the urethral wounds were kept free from all contact with urine, and in no such case was there any sign of urinary fever, while in the internal urethrotomies which he had previously performed, rigors and febrile symptoms were of common occurrence.

Other observers do not agree with Mr. Harrison on this point. Dr. F. S. Watson, of this city, has recently performed a series of such operations; *i. e.* combined internal and external (perineal) urethrotomy, and in two of the cases with perfect bladder drainage, and with every care given to surgical cleanliness there were attacks of urinary fever.

Mr. Harrison, then, is a supporter of the absorption theory of the causation of this fever, and in his articles on the subject tries to answer the two main arguments which are brought forward against this view.

In the first place, it is asked, "If this fever is septic, why don't we get it in very severe form in cases of urinary extravasation?" His reply to this is, that when urine is extravasated it acts as a local poison, killing the surrounding tissues, so that little if any absorption takes place.

Again, it is asked, "If this fever is septic, how are the rapidly fatal cases to be explained, — that is, the cases which die in 24–48 hours, with no lesion of continuity in urethra or bladder discoverable at the autopsy?" To begin with, such a lesion may readily exist and be an ample channel for absorption, and yet not be readily found at an autopsy; and, besides this, the cases referred to are not cases of urethral or urinary fever at all, but are admirable examples of the severer form of shock already spoken of at some length.

Now comes the question, "If this fever is due to the absorption of certain poisonous products, what are these products?"

In a series of articles which appeared in the French medical journals between 1882–1886, Dr. Bouchard reports the results of an interesting series of investigations in this direction.

Bouchard found that in the healthy person there exist certain alkaloids, which are formed in the intestinal tract as

a result of the activity of putrefactive organisms; that these alkaloids are excreted in part by the kidneys and so are to be found in normal urine; and that the diseases which augment these intestinal alkaloids must also augment them in the urine. Then he found that urine injected subcutaneously produced certain effects upon rabbits, and that these effects varied, according as the person furnishing the urine was healthy or not. Next he proved that the symptoms produced were not due to any of the ordinary chemical constituents of the urine (water, urea, uric acid, salts, etc.), and inferred that the alkaloids mentioned were therefore the causative agents. At all events, whether the poison absorbed consists of bacteria themselves or of the results of bacterial activity, these investigations are extremely valuable if only as a suggestion of how much there remains for the medical chemistry of the future to make clear to us.

III. *Cases of Chronic Fever.*—And now to consider a third class of disturbance following urethral instrumentation. These are the *chronic* febrile cases and form a very distinct class by themselves. In them, the attack follows the passage of a catheter for the relief of a more or less distended and atonied bladder. An old stricture or a gradually progressive prostatic hypertrophy has caused a long-standing obstruction to urinary outflow. The result has been a slowly but constantly increasing amount of urine retained in the bladder, so-called "residual urine," and a consequent long-continued distension and slowly increasing atony of that organ. Such a case comes sooner or later to the surgeon for relief, complaining that he cannot hold his water; that it is constantly dribbling away from him. Inquiry reveals the fact that the trouble has existed and been increasing for several years, and the catheter draws off a considerable amount of residual urine. The patient is instructed as to his condition and started regularly on his catheter-life. In a few days he begins to feel poorly,

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has chilly feelings, but not necessarily a distinct rigor. He becomes feverish, but his fever is slight and has distinct intermissions. He loses his appetite, suffers considerably from thirst and feels wretchedly at all times. Tongue becomes dry and covered with a brown coating. Examination of the urine generally shows a cystitis more or less marked, even if this condition did not exist before the beginning of regular catheterism. This condition may persist for weeks and yet the patient recover with proper care, or it may terminate fatally, in which case there will be found almost invariably advanced disease of ureter and kidney.

If the obstruction has been of long duration before relief was sought, there is usually a more or less marked atony of the bladder wall and a urine of very low specific gravity, the latter suggesting the probable existence of dilated ureters with hydro- or pyo-nephrosis. These are the cases which terminate fatally.

If, on the other hand, relief was sought early, the febrile disturbance will probably disappear gradually and the patient may continue his catheter-life in comfort for years.

Sir Henry Thompson says that when catheter treatment is begun so early that the amount of residual urine in the bladder does not exceed ʒ xii.–xv., a favorable prognosis may generally be given.

It has been asserted, notably by Sir Andrew Clark in an article published in the London Lancet for Dec. 22, 1883, that this form of fever may exist and prove fatal with no such serious disease of the kidney discoverable at the autopsy. If this is true, it must be rarely so, as it is certain that such disease exists in most of the cases. He mentions two cases which died of this form of fever. In one there was no autopsy, and in the other the report is as follows: — "The prostate was enlarged, the bladder was dilated and thickened, — viewed from the inside it was trabecular and slightly

saccular,—the mucous lining congested and in part *eroded*, and everywhere coated with a grayish-white, stinking mucus. There was nothing to be detected in the urethra or kidneys, although they were examined carefully." With such a vesical condition as the above, is it not possible that the fatal issue was due to a septicæmia which had its starting point in the bladder?

What is the cause of such an outbreak of fever as the one just described? Mr. Henry Morris describes it as follows: — He says, "It is to the state of the kidney prior to surgical treatment, and not to the state of the bladder after the commencement of catheterism, that we ought to look for an explanation of this form of fever." In other words, this so-called "surgical kidney" is not necessarily the result of an extension upward of a septic inflammation from below; but the disease already existing in the kidney is the starting point of the trouble which follows catheterization. He says that two conditions are essential to bring about the disturbance.

1st. A pre-existing degeneration of the secreting substance of the kidney.

2d. An alteration, from obstruction, in the intra-renal pressure, whereby the ureters, pelves and calices of the kidneys become dilated.

That when these two conditions exist, a state of active congestion is started in the kidneys by the release of this pressure when a catheter is passed. This increased blood supply to the kidneys cannot be controlled by the natural elasticity of these organs and their capsules, because the pre-existing chronic changes in these organs have led to a firm adhesion of the overstretched capsules; and the elasticity of the renal substance has been destroyed by the intra-renal pressure of the long pent up urine. So the kidney substance in active congestion is between two firm pressures, and the result is an acute pyelo-nephritis in addition to the

chronic interstitial changes which already existed in the kidneys.

For the fatal results which are said to take place occasionally without renal disease to account for them, no explanation has been offered as far as I am aware.

IV. *Cases of Direct Septic Infection.* — Before speaking of the treatment of these various forms of disturbance, it seems proper to mention the trouble which may arise as a result of direct septic infection following instrumentation upon urethra or bladder.

Of this but little need be said. As the result of the passage of an unclean instrument, we may get a simple cystitis, accompanied by slight if any constitutional disturbance. This may and generally does clear up and disappear under proper treatment. Or the septic process may extend up the ureter and cause a pyelo-nephritis and death from the "surgical kidney," so-called.

Again, we may have absorption of the septic material through a wound made by the instrument, and so a true septicæmia may begin. This may prove slight and end in recovery, or may prove speedily fatal. Finally, as a result of purulent absorption, we may have the rare complication of pyæmia with pus formation in joints, pleuræ, etc. This proves fatal in the majority of cases.

We have spoken of four classes of disturbance following instrumentation on the male bladder and urethra, and in these four classes can, I believe, be arranged all cases of disturbance of this sort. These were:

1st. The cases of "urethral shock," brought about by the simple passage of an instrument in the urethra; very common and as a rule of little importance, but occasionally terminating in speedy death. This fatal form is rare and generally associated with renal disease of some sort.

2d. The cases of "acute urinary fever," caused probably

by absorption of poisonous products from the urine; this acute attack at times recurring without any known cause, such as further instrumentation.

3d. The cases of "chronic urinary fever," coming on after catheterism, in cases where obstructive disease had pre-existed in some form for a long time.

4th. Cases of "septic infection" from an unclean instrument. This may be merely a mild cystitis, may extend upward and cause septic trouble in kidney, or may manifest itself as a true general septicæmia or pyæmia.

It is certainly unwise to use any one term, be it "catheter fever" or some other, to include these different sets of cases. The cases of nervous disturbance, the "shock" cases, differ in no respect from cases of nervous shock produced in other ways. The same may be said of the septic cases. This leaves us two sets of cases to which the term "urinary fever" may properly be applied; the acute cases and the chronic cases occurring in patients with obstructive disease. To these two classes the terms "acute urinary fever" and "chronic urinary fever" may be properly applied.

Treatment. — Of the treatment of the acute urinary fever there is little to say. Quinia, of which much has been written, is of no value as a preventive of the attack. This, however, cannot be said of aconite, which given in ♏ii. doses of Fleming's tincture, as recommended by Mr. Long, seems often to be of value as a prophylactic. Frequent small doses of digitalis are of value in cases associated with suppression of urine. Dr. Keyes says, in speaking of prophylaxis: "I do not know any remedy that can avert chill in all cases, but I place more reliance upon a combination of pilocarpine and morphine than on anything else."

The importance of surgical cleanliness and proper drainage of urine in the treatment of urethral and bladder cases cannot be over-estimated. All instruments should be surgically clean, and in cases of urethral operations, when it is

not deemed best to entirely prevent contact of urine with the wound, either by tying in a catheter or by doing a perineal section, the urethra should be cleansed by frequent careful irrigation.

That the chronic cases can always be prevented by proper care is of course not true; but that the frequency of their occurrence can be controlled by careful attention to the details of catheterism, is true.

Having decided to start our patient on his catheter-life, how are we to proceed?

The patient should rest quietly indoors, with a light diet (chiefly milk) for two or three days before the first catheterization, and for the first week or so of regular catheterism. The catheter should be passed regularly, as often as may be found necessary in the individual case, and with the instrument which is found best adapted to that case (generally a Condé instrument of moderate size), or a soft rubber catheter.

The bladder should never be completely emptied, and this is of greater importance the longer the obstruction to natural urination has existed, and the greater the quantity of residual urine and atony of the bladder wall which results. A good method to pursue is to draw off a moderate amount of urine slowly, and then to replace this by a smaller amount of some mild antiseptic solution, such as boracic acid, permanganate of potash or corrosive sublimate.

In this way the bladder can be carefully and gradually emptied in the course of a few days, without any sudden diminution in the pressure of the pent-up urine which has been present for so long.

There should be no unnecessary manipulations in the early days of the catheterism, and irrigations of the bladder for the cure of a purulent cystitis should be deferred until the patient's bladder has become accustomed to its new condition.

Finally, the patient may be duly instructed to catheterize himself after he has become a little familiar with the procedure.

If some such plan were carefully carried out in cases of this sort, we should have fewer and milder cases of chronic urinary fever.

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DISCUSSION.

Dr. A. T. Cabot, of Boston, said that he had little to add to Dr. Thorndike's excellent description of the various conditions that might arise after catheterization. That he had seen cases of:

1. Urethral shock both mild and severe.
2. Septic accidents, including simple inflammation from germs introduced on the instrument, septicæmia from the absorption of septic products, and urinary fever from the absorption of urine through a wounded surface.
3. Uræmic accidents usually associated with, *a*. interstitial nephritis; or, *b*. pyelonephritis.

In regard to treatment, he had little to add to the treatment spoken of by Dr. Thorndike, but wished to suggest the importance of morphia in counteracting the ill effects of the severe shock following urethral instrumentation.

In regard to the treatment of those cases of distended bladder due to obstruction in the urethra or prostate, he would like to emphasize the importance of great care in the matter of cleanliness, and in the gradual emptying of the bladder. In these cases, when extreme, the distension includes not only the bladder, but also the pelves of the kidneys. The dilated ureters open the way for the extension of inflammation from the bladder to the kidneys; and it is just in these cases that the kidneys are already affected by interstitial nephritis, and are ripe for an acute pyelonephritis, with suppression and death. The sudden emptying of the bladder taking the pressure off of the pelves of the kidneys may even lead to an acute congestion of the already disabled kidneys, and so often to sudden death. It is, therefore, important to draw the water so slowly, and in such small quantities at a time, that the kidneys do not feel the shock of sudden emptying, and gradually adapt themselves to the changed condition of collapse, as they have already done to the gradually increasing distension. This cannot be done too carefully. The quantity of urine at first drawn in such a distended bladder should be but a small part of that contained, and only as the bladder gradually regains its contractility can a larger and larger amount be removed.

Of course, in cases of a less degree of distension these precautions are not so imperative; but in cases of extreme distension too great care cannot be exercised.

The speaker referred to a case then under his care, in which although the bladder was distended so as to reach above the umbilicus, it would not tolerate the removal of more than ten to twelve ounces without leading to evidences of congestion of the kidneys.

ARTICLE XIII.

NOURISHMENT IN ACUTE DISEASE.

By FRANCIS H. WILLIAMS, M.D.
OF BOSTON.

READ JUNE 10, 1891.

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SOME SUGGESTIONS ABOUT NOURISHMENT IN ACUTE DISEASE.

THERE are few questions in the treatment of disease which have to be decided so often during the daily routine of practice as those which concern the proper support and nourishment of the patient; and, further, there are not many things connected with the care of patients which are so difficult.

It is not easy to find a person competent to prepare suitable food; it is, therefore, the more incumbent upon the physician to be able to give proper directions as to its preparation.

The chief thing is to take pains, and those who can do this are rare people, whether physicians, relatives or nurses. This is why less is accomplished than there should be in the support of the sick. If we wish to succeed in avoiding nausea, vomiting and loss of strength and even loss of life, we must learn to offer nourishment to our patients in a suitable form.

It will be my endeavor to recall to your minds a few of the principles to be kept in view in feeding patients acutely ill.

Foods may be classified as follows: —

1. Water.
2. Salts.
3. Fats.
4. Sugars (Fruits).
5. Starches.
6. Albuminoids.

The classes of foods known as starches and albuminoids are the ones which require the most care to offer to a patient in a proper form.

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Water is of prime importance. Consider for a moment the composition of the body of a man weighing 154 pounds as illustrated by these blocks. He is 108 pounds water, or about two-thirds.

It does not follow from this that we need give every patient several pints of water a day; by no means, but it is fair to infer that water, of a suitable temperature, should not be denied the sick, and that patients too young, too delirious, or too ill to ask, should not be neglected in this regard. The physician should see to it that water is offered the thirsty economy in all cases, nature demanding it though the patient makes no request.

Salts are present in small proportion in most foods, and are essential constituents of our diet.

Fats as a rule are not tolerated by patients acutely ill, and their use should be limited to such forms as are finely divided, as in milk or yolk of egg (and even in milk it may be necessary to reduce the amount of fat by skimming off the cream).

Common Sugar is rapidly and perfectly changed into grape sugar and into maltose before it is assimilated.

Grape sugar and maltose are very soluble and easily absorbed, and for this reason seem a very desirable form in which to give nourishment.

Horlick's and Mellin's foods are examples of preparations made up chiefly of saccharine substances.

Fruits are valuable to give variety to the diet and to contribute water, which they contain in large proportion. Most fruits contain 85 to 90 odd per cent. of water, some sugar and the citrates, malates and tartrates of potassium. Other fruits, such as grapes and bananas, contain sugar in considerable proportion, to 20 per cent., and their value as foods is not to be despised.

Among dried fruits, dates and figs contain 60 per cent. of sugar and 6 per cent. of albuminoids.

The value of certain fruits for persons who are predisposed to uric acid, gravel and concretions in the bladder I shall not discuss here, though it is well worthy of attention.

Though we take foods into the stomach in the solid form, it is necessary that they be made soluble before they can be assimilated. The classes of foods which we have thus far considered are readily absorbed, namely, water, salts, fats and sugars; they are all liquid or readily soluble substances. In the remaining classes, starches and albuminoids, we have foods with which there are several steps to be gone through before they can be taken up by the system.

With all starchy foods, like grains, potatoes and rice, it is necessary to break the starch granules by heating or some other simple process, and before the starch can be absorbed it must be converted into a soluble substance, such as dextrine, which is the same in composition as starch. Starches, therefore, are not absorbed as such, but must first be rendered soluble.

Uncooked starches vary very much in the rapidity with which they may be converted into sugar by the action of the saliva. The starch of Indian corn is converted in three minutes, whereas wheat starch takes forty minutes and potato starch three hours. After thorough cooking, all starches require nearly the same time. It is, therefore, important to have starchy food well cooked before it is given to patients.

Arrow-root forms by cooking with water a mucilaginous liquid, not a pasty mass; it is, therefore, not apt to irritate the stomach and intestines. It should, however, not be used alone for more than a few days together, as it contains too little of the other constituents of a proper diet. In this it differs from rice or potato or bread, which contain gluten, salts and fats in addition to starch.

Rice is better steamed than boiled, as it loses to boiling water much that is valuable. Boiled potatoes are for the same reason less nutritious than baked ones.

As regards *albuminoids*. Wholly without albuminoids, unless the disease is of short duration, the patient cannot exist. Since they are imperatively needed, they should not be omitted from the diet, even where digestion fails almost completely.

Albuminoids are complex in composition and decompose readily, and in their preparation more care is required than with any other kind of food. To avoid decomposition, they should always be fresh; and to prevent losing the albuminoids by coagulation, they should not be heated to too high a point.

To prepare meat foods properly, two things must be borne in mind. 1st. Albuminoids as a rule coagulate when heated to boiling. (The casein of milk is an exception to this.) 2d. To obtain a good meat flavor, the meat must be subjected to a temperature much above the coagulating point of albumen. It is, therefore, necessary to resort to two procedures, one which has for its object to extract the flavor, the other to extract the albuminoids without coagulating them.

If we treat meat with boiling water, we get beef-tea, which contains only a small percentage of solids and almost no albuminoids. This applies to all clear beef-tea. Beef-tea is of service in two ways: its taste and odor are agreeable, and together with the heat of the hot water, which acts as a stimulant, it makes a valuable article for use in the sick-room. Not as a food, but as a flavoring.

Some of the extracts of meat made with hot water may be used instead of ordinary beef-tea, thus saving much time. Liebig's and probably similar extracts of beef contain no fats, gelatin or albumen. It is desirable to use only a small amount of extract, say one-third of a teaspoonful to a teacupful of hot water, as too much gives an unpleasant flavor.

Now as regards the juices of meat which contain albuminoids in solution.

From raw meat one cannot obtain as much juice as is easily expressed from the same amount of meat which has been previously heated. The reason is this: the envelope of the muscular tissue is a substance similar to gelatin, which swells and dissolves when heated, and thus after broiling the liquid portions of a steak flow out more readily. A steak when well broiled swells; if it is cooked too long, the albuminoids coagulate, it loses moisture, shrinks and becomes tough.

A slightly broiled steak may be cut into square pieces, and pressed or squeezed or twisted in a piece of cotton cloth to extract the juice.

In administering beef juice, great care should be exercised to avoid heating it to 136° F., at which point its albumen coagulates in flakes.

Beef juice, though fourteen times as rich in albuminoids as beef tea, is so raw in flavor that it is rejected by many palates. To overcome this objection, it is only necessary to add a proper quantity of any extract of beef of good flavor to make it delicious,—about the size of an almond to an ounce of beef juice. Thus by a union of two bodies, one rich in albuminoids and the other rich in flavor, we get something that is superior to either.

Beef juice is an excellent article of diet where solid food cannot be given, but it is somewhat troublesome to prepare. A pound of meat yields about four ounces of juice; it therefore costs about five cents an ounce.

Soluble albumen, such as is contained in expressed meat juice, is absorbed in the rectum to nearly the same extent as complete peptones. Albuminoids in solution are not precipitated in the stomach and afterwards dissolved, except in the instance of casein of milk, which, as already said, is first coagulated and then dissolved.

Being accustomed to prescribe meat juice, I was much pleased to find a preparation of it manufactured by a well-

known firm. I hoped in this to realize all the advantages of beef juice, without its inconveniences. An analysis of this preparation which was made for me was disappointing, as it was found to contain only one-third of one per cent. of albuminoids, compared with seven per cent. in beef juice; it had also more salt than is desirable,—twelve and one-half per cent. This is mentioned to illustrate the advantage of using foods which are prepared at home, in preference to those made by manufacturers, of which the composition is unknown. This preparation costs thirty-five cents per ounce, though it is only one-twentieth as rich in albuminoids as beef juice costing about five cents.

If one cannot conveniently get albuminoids from meat, a very nutritious broth may be made by means of hot water into which an egg has been stirred. Here we may heat three ounces of water to not above 149 degrees F., and stir into it a raw egg. The liquid is milky if we use the yolk; clear if only the white is used. It has little taste, which is an advantage with many patients, or it may be flavored with beef extract.

If one has no thermometer at hand, the temperature of the water may be determined in two ways. If the finger can be kept in the water for two seconds, or about the time it takes to count ten hurriedly, the temperature is not too high. Liquid of this temperature is apt to burn the tongue. 140 degrees F. is as hot as one can drink a liquid, and 122 degrees F. is a very comfortable temperature for a hot drink.

When these experiments were begun, it was feared that a temperature sufficient to coagulate albumen might be so low as to be lukewarm; but a few tests showed that any temperature which can be borne in the mouth will not coagulate albumen. (Though these two temperatures differ by only a few degrees.)

It is interesting to compare the composition of four liquids containing albuminoid constituents.

Beef tea,	Beef juice,	Raw egg with 3 ʒ water,	Milk,
about ½%.	about 7%	about 5% alb.	4% alb.
		6% fats.	4% fats.
			4% sugar.

In all of these we get a good proportion of salts.

It may happen that the digestive organs cannot tolerate eggs, or, more especially, milk. But by means of powders which contain pancreatic ferments, such as Fairchild's peptonizing powders, milk may have its albumen converted into albuminoids, which do not coagulate by heat, and into diffusible albuminoids or peptones. In the ordinary process of peptonizing milk, both of these bodies are formed, but the proportion of peptones is small.

In the case of milk, which forms solid curds in the stomach, a partial conversion of its casein into albuminoids which do not coagulate, has obvious advantages. Peptonized milk is so well known that I hesitate to do more than mention it to you; on the other hand, it is so useful a preparation that I will say a few words about it for the sake of such practitioners as may not appreciate its value, especially as there are a few precautions necessary to its successful use. The powder is put into a quart bottle, with a little water, milk is added and the whole is placed in a vessel of water about as warm as the hand. The process of partial digestion goes on while the milk is at this temperature; boiling stops it, cold delays it and preserves it. If the digestion is continued in this way for twenty minutes or more, the milk has a bitter taste. If this taste is objected to by the patient, the time may be shortened to five minutes or even less, in which case, however, the amount of artificial digestion is small. If the milk is to be given by the rectum, the digestion may be kept up for two hours; in this case the milk does not curdle when acids are added to it. About

four quarts of peptonized milk will support a person in health.* For a patient in bed, less than this is sufficient, the amount varying with each individual.

Milk treated in this way contains albumoses and some peptones. For our purposes, we may broadly define albumoses and peptones as soluble albuminoids, which cannot be coagulated by heat or dilute acids; and peptones have the further property of passing through the membrane of a dialyser, and represent a later state of digestion.

Even after prolonged digestion, we get in peptonized milk only a small amount of peptones, the casein being converted chiefly into albumoses.

The bitter taste of peptonized milk is not thoroughly understood; albumen and albumoses are tasteless, and peptones have a cheesy taste.

Meat albuminoids are converted by the stomach into bodies which are soluble or diffusible, and these substances when artificially produced have been regarded as calculated to render great service in invalid feeding.

It is known that an increased secretion of urea appears after the administration of peptones, just as it does after the ingestion of unaltered albumen, and that the chemical composition of peptones differs little from that of ordinary albuminous bodies. They have the manifest advantage of being easily and immediately absorbed. Peptones, so far as we yet know, may be used during short periods of extreme exhaustion, when perhaps few other albuminoids could be assimilated.

Many preparations have been offered for sale which purport to be peptones, but which really contain only a small amount of them. Many such preparations are soluble in water, but have a very disagreeable odor and unpleasant taste.

So much in outline for the various classes of foods.

* Horton-Smith. Journal of Physiology, April, 1891.

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Since acute disease is accompanied by fever, we must consider the effect of feeding in cases where the temperature is febrile in character; also, the amount of food, its quality and quantity, together with other conditions affecting its absorption.

In acute disease accompanied by fever, what are the conditions? The body loses weight, the urea especially is increased, and carbonic acid and water are excreted in larger amount than in health. All of this loss is not dangerous if allowed to go on for a few days only, and if the amount does not exceed certain limits.

But to replace these losses, we are at a disadvantage as regards the ability of the system to assimilate food. In fevers, the appetite is small, or may be completely lost. The saliva, the gastric juice, the pancreatic fluid, the bile, are less efficient in action or are diminished in amount during high temperature. The stomach is very sensitive, in part perhaps through sympathy with the increased sensitiveness of the nervous system as a whole.

If there is much hyperæsthesia of the digestive tract, as in typhoid, in peritonitis, in dysentery or gastro-enteritis, one must be careful not to give too much food, and it should be in liquid form.

It is not, however, the administration of food, but the administration of unsuitable food that we have to fear, and also the giving of nourishment in quantities unsuited to the digestive powers of the patient.

One should not give the patient what he cannot digest, nor should we give him less than he can assimilate. The attendant must have a constant watch over the condition of the patient's powers of digestion, and carefully adapt his food to his capabilities, especially during convalescence.

Our attention should be devoted not only to what is put into the alimentary canal, but also to what goes out. For example, if curds of undigested milk are found in the stools

of a typhoid patient, the quantity of milk should be diminished, or it should be diluted.

Large quantities of milk are often given to typhoid fever patients, to their great detriment, and excess of zeal in feeding and too little care in the preparation of the food cause much of the intestinal trouble that complicates these cases. In diphtheria, foods which are soft in consistency, rather than liquids, may be used, as they are less apt to get into the trachea.

Every careful observer of the sick will agree that many patients are starved in the midst of plenty, simply from the want of attention to the ways which alone make it possible for them to take food.

For example, if the patient has a fever with remissions or intermissions, it is of the first importance to remember that the ability to digest food at these times is greater, and the more nourishing portions of the diet should be given during the remissions and intermissions.

As far as practicable, the mouth should be kept clean. The tongue may become cracked and dry; it may stick to the sides of the mouth, and cause so much pain when the attempt is made to swallow that the patient refuses food which he would otherwise take. The mouth should be rinsed with water after taking food, and should be carefully cleansed with an antiseptic solution from time to time.

In a word, for extreme cases, the important thing is liquid food.

We should give water.

We should give sugars (starches have no taste, but are less readily absorbed).

Fats are not tolerated.

Salts are present in nearly all foods.

We should give albuminoids, in beef juice, in peptonized milk.

Ordinary milk becomes solid in the stomach.

The physician should never lose sight of the patient's likes and dislikes; one cannot diet a patient from a book, or from the chemical composition of foods. On the other hand, it is incumbent upon the physician to know how to choose such a variety in diet as to include both what is palatable and what will afford a proper amount of nourishment.

It has been one of the aims of this paper to show that the preparation of some valuable foods is entirely in our own hands, and that we need not be dependent upon manufactured preparations, of whose composition we are often ignorant; and further to emphasize many details concerning the nourishmeut of patients, which, though well known and often repeated, are also too often overlooked.

Among other authors, I am indebted to Munk & Uffelman, to Bunge's Physiological Chemistry, and to the recent books on Food by Church & Yeo, and especially to Mrs. Richards, instructor in Sanitary Chemistry in the Massachusetts Institute of Technology, who kindly made the analyses of beef juice.

DISCUSSION.

Dr. J. W. Warren, of Boston:—I regret that I did not hear all of Dr. Williams's interesting and important paper, but I think that I agree pretty fully with his general conclusions. There seems to be unfortunately a disposition to accept various food preparations from the manufacturers and to make use of them without any very clear knowledge of the way in which they are made. This condition of things is very natural on account of the apparent convenience of such preparations, and the makers of course do all they can to encourage the physician to think well of their various "foods," and, if we may draw an inference from their number, with considerable success. It is well, however, to be reminded, as we have been by Dr. Williams, that it is practicable to prepare suitable foods by the use of beef juice or eggs by means of which patients may be properly nourished when acutely ill, and that we may thus be sure that we are actually giving our patients

just what we wish them to receive. The commercial preparations which are predigested must in many cases involve the possibility of introducing deleterious substances into the body, since these "predigestions" can hardly be made, especially if pancreatic ferments be employed, without a certain amount of change being brought about by micro-organisms. While I am perfectly well aware that little or no damage has been as yet clearly observed to result from these causes, I can but feel that here is a distinct source of danger which ought never to be lost sight of. One cause of trouble in many acute diseases must be recognized in the deficient secretion of hydrochloric acid. This leads not merely to defective gastric digestion, but permits many micro-organisms to pass on into the intestines instead of being destroyed in the stomach, as they would be were that organ acting normally. Thus many fermentative changes occur in the stomach and elsewhere which must be considered as harmful to the patient besides interfering with his nourishment. It follows then that the administration of hydrochloric acid is of great importance, and that probably much larger amounts might be profitably given than is usually done. This leads me also to say that the use of hydrochloric acid in the "predigestion" of food or in preparing it so as to make its assimilation easier, has not in my judgment received the attention it deserves. I feel that this subject ought to be looked into more fully from the clinical side.

Briefly then we have in real, home-made beef juice, or in mixtures of eggs with water or milk, foods of such a nature that we can be sure that we are actually giving reasonable quantities of albuminous material. If advisable we can add sugars which are very easily absorbed, but should not forget that they may readily ferment. The loss of water to which the organism is constantly subjected must be fully made good, and perhaps more attention ought to be paid to supplying salts, especially sodium chloride. Recent work in rectal alimentation has shown the importance of this salt in aiding absorption, and it may be supposed to be of service in other parts of the digestive tract.

Dr. W. H. Pomeroy, of Springfield:—I desire to express my interest and enjoyment in the paper, both from its special practical importance and the fact that a few

years before it was my pleasure to devote some time to the study and investigation of the subjects treated. Recognizing the self-limitation of many acute diseases, but at the same time the increased tissue-waste of high temperature and changes in functional activity of processes of digestion and assimilation, the most important and essential consideration in many cases is this of nutrition; and failure in exact knowledge of the food necessary and the actual practical methods of its administration in the changed conditions of acute disease, is often disastrous to the patient's chances of recovery. The physician should know the absolute food value of any preparation upon which he relies for nourishing a patient. The innumerable "extracts of beef," so industriously distributed in sample bottles, should be known to contain *nutritive* principles in appreciable amounts before he should be willing to risk his patients' lives by relying on them. Liebig's Extract—manufactured on the principle of a clear soup—has been shown to be almost entirely devoid of albuminoids or *nutritive* principles. Yet Liebig's Extract is the popular favorite, often exclusively relied upon. "Valentine's Meat Juice" is said to be prepared on a principle that *ought* to yield more albuminoids, but I am unable to state by analysis whether the claim is substantiated. "Beef tea" certainly cannot be relied upon; and in view of these facts it becomes extremely important for us to know the "home-products" that are reliable. I quite coincide with the writer in the preference given to peptonized milk. Peptonizing powders, although a manufactured product, can be relied upon because we have the test in the change produced in the milk, and they are only a means in the preparation of a home-made product of the nutritive value of which there can be no question. Personally I give peptonized milk the preference over any single nutritive preparation in liquid food.

ARTICLE XIV.

PRODROMAL AND EARLY SYMPTOMS OF BRIGHT'S DISEASE.

By CHARLES F. WITHINGTON, M.D.
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READ JUNE 9, 1891.

XUM

PRODROMAL AND EARLY SYMPTOMS OF BRIGHT'S DISEASE.

No feature of Chronic Nephritis, more especially in the interstitial variety of the disease, is more startling than its insidiousness. A man generally supposed to be in good health is suddenly stricken with convulsions, and the urinary examination, then for the first time made, shows renal degeneration to be extensive, inveterate and irremediable. Or the autopsy-table is the first revealer of the chronically contracted kidney, whose slow changes have for years, all unconsciously to its possessor and to his family, been undermining the citadel of life.

Even the careful medical examiner, with his suspicions aroused, may fail to detect the fatally advancing disease, by urinary examination. Dr. H. C. Wood[1] has published a number of cases in which he says the urine was absolutely normal, so far as his tests could go, and yet advanced cirrhosis of the kidney was present. Flint also insists that the urine of renal cirrhosis is sometimes perfectly normal. Fortunately we may, I think, believe that instances are rare in which interstitial disease fails to betray itself, if examinations are careful and repeated. Yet the experience of these writers, not lacking the support of other authorities, as to the elusiveness of the physical signs of this affection in some instances, may well make us seek for all possible means, in obscure cases, of confirming our evidence.

[1] Boston Med. and Surg. Journal, vol. cxii, p. 49.

XUM

The class of persons most obnoxious to chronic (interstitial) nephritis, hurried and over-worked business men, in the height of their activities and responsibilities, are not introspective. They are not symptom-hunters, and so long as their bodies answer reasonably well to the exacting demands which they make upon them, these men make no complaints. Hence early symptoms which persons of the other sex or of different temperament would speak about, are unnoticed or ignored.

What are the prodromal or at least the early symptoms, significant of this affection, which should arouse the physician's suspicions and put him on the track of a diagnosis? Such symptoms may, as I have said, be *nil*, or they may be of such a slight and vague character as to point to nothing more serious than digestive disturbance or the result of fatigue. But they will bear the closest study.

Without at the present time going into any discussion of the vexed questions regarding the pathogeny of this disease, and looking upon the subject chiefly in a clinical light, we may, I think, put foremost among the prodromata of chronic interstitial nephritis, some manifestation of *gout*. It may be latent; it may show itself by no more patent sign than lithuria. This connection is generally admitted, though we may not go so far as to say with Tyson that gout is always, sooner or later, followed by interstitial nephritis. That statement is of course to be taken subject to the limitation that the patient must be spared from intercurrent diseases long enough to complete the evolution of his nephritis. A gentleman now under my care with lithuria, a trace of albumen and hyaline and finely granular casts, tells me that 46 years ago he had what was diagnosticated by a prominent Boston physician as gout, though he has never had any arthritic symptoms of the disease since. I have been able to trace a similar connection in more than half my patients either to arthritic gout or to "gravel."

It may be remarked in passing that Virchow,[1] who disputes the currently believed relation between uric acid calculi and gout, nevertheless admits the frequent infiltration of urates in various parts of the body, including the kidney, in persons suffering from latent gout, and thinks that both the renal changes and the joint affections are due to the urates loading the blood.

Danforth[2] has recently sketched graphically the development of early pathological changes in the kidneys due to irritating substances in the urine, among the first of which he places uric acid. To a less degree he finds oxaluria and phosphaturia sources of irritation to the tubular epithelium and so of renal inedequacy.

Less intimate as a diathetic antecedent of nephritis than gout, is rheumatism. It not infrequently happens that a rheumatic attack serves to *declare* a contracted kidney. The patient fails to rally well from his rheumatism, and examination reveals an interstitial nephritis, which in some instances doubtless may have antedated the rheumatism.

The growing importance attached to chemical factors in the ætiology of disease (with the discovery of ptomaines and other noxious chemical products of microbic life) and the apparent relation above referred to between uric acid, as a chemical irritant, and the production of renal changes, suggest the inquiry whether other chemical poisons, such as lead and arsenic, which Dr. Putnam has shown us are so frequently detectible in the urine, may not stand in some relation to Bright's disease. If, as one may believe, gout has a kinship on the one side with lead poisoning and on the other with nephritis, it seems not unreasonable that its two congeners might sometimes have a direct communication with each other.

Sir Andrew Clark has described a "renal inadequacy,"

[1] Berliner Klin. Wochenschrift, 1884, No. 1; and London Medical Record, November, 1884.

[2] Transactions Association American Physicians, vol. v. p. 257.

which he thinks is perhaps a very early stage of Bright's disease, where there is as yet no visible alteration of structure, but where a healthy secretion cannot be produced.[1] The urine is a little scant, has a low specific gravity and is deficient in urea. Such patients take cold easily, and in the event of an acute illness or of a surgical operation, do badly. A restriction of the diet, the author says, increases the urea elimination and the health of the patient. A strong objection to this view has been raised in the query, How, if the kidney is "inadequate" to the secretion of a normal amount of urea, can the reduction of the diet, with the diminution of the material out of which urea could be obtained, possibly increase that product?

The line of demarkation between prodromal and early symptoms of Bright's disease can probably never be sharply drawn. Just when, for instance, lithæmia passes over into the graver affection we may not know. But all persons who have finally died of interstitial nephritis have at some time passed over that (or some other equally) shadowy line. Could it have been known when they were approaching it, treatment then might have been of some avail. Of the symptoms of the early stages of pronounced Bright's disease, some, as will be seen, are far from distinctive. But when they are grouped with others, in themselves no more characteristic, the combination acquires a greater significance.

In classifying the symptoms of Bright's disease one is tempted to use as a basis the various pathological processes which have been recognized as marking the evolution of the disease, as for instance hydræmic plethora, increased vascular tension, endarteritis and vascular degeneration, and finally so-called uræmia. But this classification seems to me unsatisfactory, because, first, many symptoms would come under more than one of these classes. For instance,

[1] British Medical Jour. Feb. 24, 1883, p. 345.

headache may be produced by increased vascular tension, hydræmia or anæmia. It may come from a degenerated cerebral vessel and be the precursor of an apoplexy, or it may be a "uræmic" symptom. Hæmorrhages are favored, on the one hand, by vascular degeneration, on the other by increased arterial tension. But again, there is not at present any agreement as to what is the primary pathological change, or in what order the others develop. So-called uræmic symptoms are almost certainly not due to retained urea, and are by many referred to vascular changes involving disturbances of circulation. They often are among the earliest instead of the latest symptoms, sometimes occurring in the prealbuminuric stage.

I therefore submit the following list of clinical symptoms, arranged not according to theoretical processes but to organs involved.

SYMPTOMS.

Brain.	Headache. Mental States.	Irritability, Depression. Weakness of Mind. Delirium. Insanity.
	Disorders of Sleep.	Sopor. Sleeplessness. Night-terrors.
	Motor.	Staggering. Convulsions. Paralyses.
	Sensory.	Neuralgias. Paræsthesias. Dizziness.
	Coma.	
Digestive.		Vomiting. Dyspepsia. Diarrhœa. Constipation, &c.
Circulatory.		Anæmia. Increased Tension, Palpitation, Angina. Œdema.

	Hæmorrhages.	Epistaxis. Retinitis. Hæmoptysis. Apoplexies.
	Polyuria.	Frequent Micturition. Nocturnal Enuresis.
Respiratory.		Cough, Expectoration. Dyspnœa, Orthopnœa. Cheyne-Stokes breathing. Asthma.
	Œdemas.	Glottis. Pleura. Lung.

The limits of this paper do not of course admit of the discussion of these symptoms in detail. I will merely touch upon one or two, hoping that others will be elucidated in the discussion.

The mental states in Bright's disease are particularly interesting. Early in the affection patients sometimes complain that "the head feels muddy." There is a slight haze over the intelligence which the patient himself is aware of. The soundness of the business judgment may be impaired. Irritability, petulance or depression and moroseness are noted by the friends. The patient becomes a little self-distrustful and possibly somewhat secretive about his affairs and intentions. He shows unusual annoyance, *e. g.* at the loud playing of the organ in church, at street noises, at the importunity of a peddler, etc. He dislikes to reckon or to play cards unless the simplest game, and soon tires of that. He falls asleep by day or perhaps lies awake at night. Suddenly comes an attack of acute delirium, with delusions which in the case that I have just been describing was followed by a series of eclamptic attacks. With recovery from these the delusions disappeared, and the mental state returned to nearly the condition before the active delirium.

The insanity of Bright's is recognized among alienists, not as a distinct type of mental disease, but as of ætiological

peculiarity. Dr. Alice Bennett gave an address last year as president of a section of the Pennsylvania Medical Society,[1] upon "uræmic poisoning as one of the most frequent causes of insanity." She described some twelve cases rapidly fatal, in from twelve to ninety days; as many less rapidly fatal (three months to nine and one-half years), eight of rapid and three of slow recovery, and other groups which remained stationary or pursued a very slow downward course.

Dyspnœa is a symptom, which, as will appear later, is one of the most frequent and earliest of Bright's disease. When there is any organic affection of the respiratory organs, as bronchitis, asthma, œdema, or of the heart, the symptom appears very natural. But when there is no structural alteration other than perhaps left ventricular hypertrophy, it is much less easy to explain. This dyspnœa may be continuous or paroxysmal, in the latter form amounting of intense orthopnœa with a sense of asphyxiation. Dr. E. P. Howard, of Montreal,[2] suggests that the continuous dyspnœa may be due to diminution in the number and oxygen-absorbing capacity of the red blood globules, so that the respiration is taxed to furnish the increased oxygen thereby necessitated. As for the paroxysmal dyspnœa, commonly classed as a symptom of uræmia, the mechanism of its production has not been, so far as I know, satisfactorily explained.

In the hope of determining something of the relative frequency of the earlier symptoms of chronic nephritis, I have taken off the data from 100 cases, chosen somewhat at random from the earlier record-volumes of the Nervous and Renal service of the Boston City Hospital. These cases were all diagnosticated as chronic Bright's, but the variety was not as a rule specified. The great frequency of œdema as a symptom seems to make it probable that the prevailing type of the disease was the diffuse or parenchymatous,

[1] Transactions Medical Society of the State of Penn., vol. xxi. p. 127.
[2] Canada Medical and Surgical Journal, November, 1884, p. 193.

rather than the interstitial, which detracts from the value of the figures for our present purpose. The minuteness of the early symptom-record depends of course much upon the habit of the clinical recorder, and in these cases the first recorded symptoms range from twenty years to a fortnight before the admission of the patient. In a hospital, of course, patients are not admitted until some positively disabling phase of the disease is present, and their ability at that time to recall the first symptoms of their illness is not always to be depended upon.

Of these one hundred persons, then, with "Chronic Bright's," the following numbers had experienced, prior to entering the hospital, the symptoms severally set down against them, which are arranged in the order of frequency :—

Œdema	84
Dyspnœa 42 (minus concurrent phthisis 3), leaving	39
Nausea and Vomiting	31
Frequent Micturition and Polyuria	21
Cough 23 (minus concurrent phthisis 3), leaving	20
Headache	20
Rheumatism	18
Pain in small of back	14
Blurred sight	11
Vertigo	10
Palpitation	10
Dyspepsia	8
Neuralgia	7
Weakness	7
Hemiplegia	6
Syncope and falling	4
Malaria and Bilious fever	4
Diarrhœa	3
Pain in right hypochondrium	3
Delirium	3
Convulsions	2
Epistaxis	2
Insanity, Sleeplessness, Numbness, Itching and Tremor, each	1

In just one-half these cases, are the habits as regards alcohol recorded, and of these 50

23 used alcohol, the amount not stated.
12 used much liquor.
5 used no liquor.

With a view of studying the evolution of symptoms in the most insidious form of chronic nephritis, I again had recourse to the City Hospital records, this time taking as the starting point the post-mortem diagnosis of chronic interstitial nephritis. For this purpose, aided in part by the painstaking autopsy-index prepared by Dr. Prescott, I went over the first twelve volumes of autopsy records, covering the years 1873 to 1890, selecting only those cases in which well marked interstitial disease of the kidney was established by the autopsy. From these I eliminated all surgical cases. Nineteen other cases were rejected in which the patient was brought to the hospital comatose or practically moribund, so that no adequate history of his previous condition was obtainable. Of these 19 patients, I may say in passing, 4 died of convulsions, 4 of hemiplegia, 1 of pneumonia, and the rest in coma.

I have tabulated the remaining cases, 75 in number, of persons dying from, or at least with, chronic interstitial nephritis. Of these 49 were males, 26 females. The average age was nearly 47.4 years. Twelve of these persons had died of intercurrent affections, *i. e.* diseases not directly connected with the pathological processes of Bright's disease: 7 of pneumonia, 3 of cancer, 1 of meningitis, and 1 of tuberculosis. Subtracting these cases, as possibly incomplete through having ended prematurely, I find that nevertheless the remaining 63 uncomplicated cases of Bright's died at exactly the same average age as the whole number, viz. 47.4 years.

Studying the 75 tabulated cases more closely, we learn that 23, or 31%, had suffered from rheumatism. Many of

them had had repeated attacks extending over many years; one, for instance, 20, another 30, another 35 years. Four gave a previous history of malaria.

The habits regarding the use of alcohol were recorded as affirmative or moderate in the case of 12, excessive in 10, and abstinent in the case of 4.

In seeking to establish the relative priority or sequence of symptoms, one must be on his guard against placing too much dependence on mathematical averages. The dates which are set down in the tables are computed backward in each case from the time of the patient's death. Often of course these dates are lacking, and in proportion to this defect and to the wide departure of any one individual in a small class from the others, the value of averages is impaired. With this preliminary caution, I will enumerate the symptoms in the apparent order of their priority.

1. Polyuria, with frequent micturition and especially increased nocturnal micturition, was experienced by 25 persons, or 33%; one had it 20 years before death, and 4 for 2 years and over. Eight persons, giving data on this point, showed an average of *3¾ years* of polyuria before death. This average does not, as some others will be seen to do, require to be raised to represent the true figure.

2. Dyspnœa was experienced by 47, or 64%, being the most frequent symptom. The longest case was 40 years. The average of 26 persons giving dates, was *108 weeks*, or a little over two years. But this average requires to be materially raised, from the fact that it does not include 4 persons who had had dyspnœa for "years" and 1 who had had it "always." So that the true average date of dyspnœa should be carried back nearer to that of polyuria.

3. Œdema, observed in 38 cases, or 51%. (This will be remembered in comparison with the 84% of œdema in the mixed cases of chronic Bright's.) The longest cases were 15 and 12 years. The average of 29 persons was *69*

weeks, which requires to be slightly raised on account of a 30th person who had had it for "years."

4. Cough occurred in 41 persons, or 56%. The longest 10 years: 2 for 5 years. The average of 32 persons, *47 weeks*, which is somewhat too low, as there were three others who had had it for "years."

5 (or 6). Palpitation, 19 persons, or 25%. The average of 9 persons had had it for *26½ weeks*, which is a little too low, as it does not include one person who had had it for "years."

6 (or 5). Headache, 20 persons, 27%. 2 had had it "always" and one for "years," which should materially raise the average of 11 others who had had it for *21 weeks*.

The remaining symptoms average too near each other and are based on too small a number of cases to warrant an opinion on their relative priority.

Nausea and vomiting, present in 37 patients, or 49%. One had had vomiting "always," one for "years," and 24 others averaged *9½ weeks* before death. This average is probably too low.

Amblyopia, in 11 persons, or 15%. One person had had it 7 years. Including him in 6 cases giving dates, we should have an average of 54 weeks; omitting him 5 cases give *16 weeks*, which is doubtless nearer right.

Vertigo, in 13, or 17%. The earliest 22 weeks; the average of 5, *9 weeks*.

Diarrhœa, in 16, or 21%. One had it for 10 years. The average of 10 others, *6.2 weeks*. (*Per contra*, 3 record constipation).

Lumbar pain, in 4 persons, 5%; which shows the popular fallacy of back-ache as a symptom of Bright's, at least in this form.

Cerebral hæmorrhage occurred in 10 persons, or 13%. The earliest was 5 years before death. 3 had 2 attacks, and 1 had 3. Six died from hæmorrhage of brain, or meninges.

Other hæmorrhages occurred as follows: of the nose, 7; of the lungs, 6; bowels, 2; stomach, 1.

Delirium occurred in 15, or 20%. It was generally a late symptom, the earliest case being 3 months, and 11 cases appearing first within the last two weeks of life.

Disorders of sleep are thus classed: insomnia or vigil in 11; drowsiness or sopor in 4. Rather a late symptom.

Convulsions, of course, occur late. They are recorded in only 7, or 9%. Coma, prior to the day of dissolution, in 26. Cyanosis is spoken of in 11 cases; in at least 5 it was noted 10 days or more before death.

Of other symptoms, infrequent, but of significance, I may mention:—

Itching in 2 persons.
Other paræsthesiæ in 3.
Thirst in 4.
Neuralgia in 2.
Sore-throat in 2.
Cheyne-Stokes respiration in 3.

DISCUSSION.

Dr. G. B. Shattuck, of Boston:—I am sure we have all listened with pleasure and satisfaction to Dr. Withington's excellent presentation of the subject we have before us. The subject is certainly a very important one, and unfortunately it is difficult in a direct ratio to its importance. Dr. Withington has shown us what can be done with the extensive records of our largest hospital. It is, however, from private practice that we should expect to get the most instruction with regard to the *prodromal* symptoms, at least, of Bright's disease. Now, there are very few practitioners who are in a position to give us much personal instruction in regard to this question. And those few are apt to be such busy men that they do not keep their records in a way which would make them of as much use as they might be. Then again

TABLE OF 75 CASES OF CHRONIC INTERSTITIAL NEPHRITIS.

Case No.	Sex.	Age.	Previous Diseases.	Use of Alcohol.	Œdema.	Dyspnœa.	Cough.	Palpitation.	Nausea and Vomiting.	Headaches.	Amblyopia.	Vertigo.	Diarrhœa.	Polyuria and Frequent Micturition.	Lumbar Pain.	
1	m	23	"Black Fever" 4 yrs.										22 ds.			
2	f	51			yes.		3 wks.		14 wks.							
3	f	56			3½ wk.		3½ mos. & expect'n.									
4	f	45	"Typhus and lung" fever. 11 mos.		9½ wk.	yes.	yes.	yes.					yes.			
5	m	36					yes.				yes.		yes.			
6	m		Dysentery, 3 mos.						3 mos.				3 mos.			
7	f	25			6 wks.	6 wks.			6 wks.							
8	m	50		much.	yes.	yes.		yes.	yes.	yes.	5 mos.			yes.	yes.	
9	m								yes.	yes.		yes.				
10	m	35								7 ds.	7 ds.	7 ds.		yes.		
11	f	74					7 wks. & expect'n.						Consti'p. mos.			
12	m	63	Rheumatism, 20 yrs.	much.		2 yrs.	yes.							yes.		
13	f	24	Jaundice, 2 yrs. for 6 wk.	mod.		yes.	yes.		4 wks.							
14	f	41				2 wks.										
15	m	50		none.	1 yr.	1 year.			yes.	1 year.	6 mos.			yes.		
16	m	52	Rheum. 8 or 9 times.										5 ds.			
17	m	27	Pleurisy 8 yrs. ago, fistula.	none.	2 wk.	4 days.	10 yrs.		2 wks.	2 wks.	2 ds.					
18	m	43		mod.	15 yr.	orthop.	5 wks.		yes.		2½ mos.			yes.		
19	f	59														18 and
20	m	76	Rheumatism, 30 yrs. lead colic, 20–30 yrs.		1 wk.	5 wks.	5 wks.	5 wks.						yes.		
21	m	32			12 d.		1 mo.		8 ds.				8 ds.			y
22	m	43	Rheumatism, 5 yrs.			yes.	6 wks.	yes.	yes.	yes.						
23	f	24			16 wk.	yes.		yes.	yes.	yes.	yes.	yes.		yes.		
24	f				11 d.		2–3 wks.		11 ds.				4 wks.			
25	m	70			4 wk.	yes.	"years."	"years."	6 wks.			yes.	yes.	8 ds.		
26	m	66	Rheumatism twice.		yes.	9 wks.	2 yrs.	yes.								
27	m	81			1 yr.	40 yrs.										
28	m	53	Malaria 2 yrs. ago.			yes.	4 wks, & expect'n.		yes.					yes.		
29	f	23			3 mos.	13 wks.		13 wks.	yes.			5 mos.				
30	m	67			7 mos.	7 mos.	7 mos.							7 mos.		
31	m	44	Epilepsy from childhood. Rheum. 30.	much.		6 wks.							6 wks.			
32	m	51	Rheumatism, 10 yrs.			2½ mos.	2½ mos.		8 ds.	yes.		yes.				
33	m	43	Rheumatism, 18 yrs. Malaria.			1 wk.			1 wk.							
34	f	38	Erysipelas, 7 yrs.			1 mo.	10 wks. +	10 wks. +	10 wks. +	10 wks.		10 wks.		1 mo.		
35	f	55	Rheumatism, 35 yrs.		2 yr.	"years."	3 mos.	1 year.	2 ds.	2 mos.		2 mos.				
36	m	60														4 w
37	m	26	Malaria, 10 yrs.	mod.	2 d.	yes, paroxysms, 9 wk.	9 wks.	9 wks.	9 wks.	always. worse 9 wks.	7 yrs.	yes.		4 yrs.		
38	m	33		none.		yes.		yes.	3 wks.							
39	m	46		mod.	5 mos.	14 mos. orthopnœa & choking.	6 mos.	14 mos.	6 mos.				6 mos.	6 mos.		
40	m	60			yes.					years. severe						

XUM

IS.—DIAGNOSIS FROM AUTOPSY.—*From Boston City Hospital Records.*

HEMIPLEGIA.	HÆMORRHAGES.	DELIRIUM.	DISORDERS OF SLEEP.	CONVULSIONS.	COMA.	CYANOSIS.	OTHER SYMPTOMS.	OTHER DISEASES OR CAUSES OF DEATH.
							Dysenteric.	
								Uterine tumor.
							Itching.	
							Sore throat, 5–6 weeks.	
							Stomach pain. Weakness, 3 months.	Cancer of liver.
							Weakness.	
					2 ds.		Abdom. pain. Indigestion.	
							Mind dull.	Meningitis.
					3-4 ds.		Indigestion and weakness, 5 months.	
		5 ds.					Tremor. Weakness, 2 years.	
				3 ds.	3 ds.		Indigestion and weakness, 2 years.	
					yes.	yes.		Croupous pneumonia.
					3 ds.		Weakness.	
							Parotitis, 2 days.	
								Pneumonia.
							Staggers, 2½ mos. Weakness. 2½ mos.	
18 mos. and 4 ds.	brain.						Aphonia, 1 week.	Cerebral hæmorrhage.
yes.	nose, 12 ds. mening.				5 ds.		Neuralgia, 6 months.	Meningeal hæmorrhage.
	nose, 4 wks.		vigil.				Night terrors.	
					1 day.		Chills, 2 weeks. Sore throat.	
						11 ds.	Jaundice, 7 days.	
		3 wks.			1 day.			Aortic aneurism.
		4 ds.			1 day.		Præcordial pain, 4 months.	
				2 ds.	3 ds.		Thirst.	Œdema of brain, and small tumor of brain.
	nose, 10 wks.						Weakness, 5 months.	
							Ascites.	Mitral stenosis.
					1 day.			Endocarditis. chronic.
		5 ds.	vigil.				Weakness, 2½ months.	Acute pleurisy.
							Thirst. Sore throat, 1 week. Pain in side, 3 days.	
	nose, 10 wks.	3 ds.	sopor. 2 wks.			10 ds.	Thirst, 10 weeks+ Epigastric pain.	Aortic and mitral disease.
	nose, 4 yrs. stomach, do.					yes.	Neuralgia. Paræsthesia. Indigestion, 2 mos.	
4 wks.		2 wks.						
	nose always. lungs.	2 wks.	sopor. 4 ds.				Epistaxis, finally several daily.	
	bowels, 1 wk.		vigil.	5 ds.	1 day.			
	bowels.			1 day.			Thirst, 8 months. Paræsthesia (sense of cold), 11 weeks. Weakness, 14 months.	
			sopor. 18 ds.	yes (3).	yes.			

22	m	43	Rheumatism, 5 yrs.			yes.	6 wks.	yes.	yes.	yes.						
23	f	24			16 wk.	yes.		yes.	yes.	yes.	yes.	yes.		yes.		
24	f				11 d.		2-3 wks.		11 ds.				4 wks.			
25	m	70			4 wk.	yes.	"years."	"years."	6 wks.			yes.	yes.	8 ds.		
26	m	66	Rheumatism twice.		yes.	9 wks.	2 yrs.	yes.								
27	m	81			1 yr.	40 yrs.										
28	m	53	Malaria 2 yrs. ago.			yes.	4 wks, & expect'n.		yes.					yes.		
29	f	23			3 mos.	13 wks.		13 wks.	yes.			5 mos.				
30	m	67			7 mos.	7 mos.	7 mos.							7 mos.		
31	m	44	Epilepsy from childhood. Rheum. 30.	much.		6 wks.							6 wks.			
32	m	51	Rheumatism, 10 yrs.			2½ mos.	2½ mos.		8 ds.	yes.		yes.				
33	m	43	Rheumatism, 18 yrs. Malaria.			1 wk.			1 wk.							
34	f	38	Erysipelas, 7 yrs.			1 mo.	10 wks. +	10 wks. +	10 wks. +	10 wks.		10 wks.		1 mo.		
35	f	55	Rheumatism, 35 yrs.		2 yr.	"years."	3 mos.	1 year.	2 ds.	2 mos.		2 mos.				
36	m	60														4
37	m	26	Malaria, 10 yrs.	mod.	2 d.	yes, paroxysms, 9 wk.	9 wks.	9 wks.	9 wks.	always. worse 9 wks.	7 yrs.	yes.		4 yrs.		
38	m	33		none.		yes.		yes.	3 wks.							
39	m	46		mod.	5 mos.	14 mos. orthopnœa & choking.	6 mos.	14 mos.	6 mos.				6 mos.	6 mos.		
40	m	60			yes.					years. severe 18 ds.						
41	m	75		mod.	7 wk.		yes.			2 yrs.			yes.	2 yrs.		
42	m	53	Rheumatism, 20 yrs.	yes.					2 wks.				2 wks.	yes.		2
43	m	68		yes.		always.	3 mos.						1 day.	yes.		
44	m	35	Rheumatism, 20 yrs. and several since.	much.		4½ wk.		4½ wks.		4½ wks.			4½ wks.			
45	f	50	Rheumatism, ½ yrs.		2 mos.	yes.	yes. & expect'n.	yes.						yes.	yes.	
46	f	60	Rheumatism, 3 yrs.							10 ds.						1
47	m	17	Rheumatism.	yes.	3 mos.				yes.	yes.			Const'p.	yes.		
48	m	32	Rheum. "years." Syphilis.	yes.		17 wks.	17 wks. & expect'n.			yes.			Const'p.	yes.		
49	m	68		yes.	4 wk.	15 wks.	4 wks.	15 wks.				yes.	20 yrs.			
50	m	62	Malaria, 20 yrs. Rheumatism.	mod.			3½ mos.		years.					20 yrs.		
51	m	37			4 wk.	18 wks.	3 mos.		18 wks.		5 mos.	4 wks.				
52	m	76			yes.	3½ wks.	3½ wks.									
53	f															
54	m	54		much.	3½ mo.	3½ mos.	yes.									
55	m	59	Rheum. 16½ yrs. and since	much.	12 yr.	5 mos.		16 mos.	4½ mos.					3 yrs.		
56	m	59		yes.	5 mos.											5
57	m	43	Rheum. 10 yrs.	much.	1 yr.				2 wks.	1 yr. +			2 wks.			
58	f	53				yes.			11 mos.							
59	f	70							2 wks.							5
60	m	38		much.		4 wks.	2 mos.								9 wks.	
61	m	49		much.	3 wk.	4½ mos.	4½ mos.		4½ mos.							
62	m	61		much.					10½ wks.	yes.						
63	f	62			years.	years.	3 mos.		"always."		yes.			yes.		5 y
64	f	27							6 wks.	always.						
65	f	36				5 yrs.	5 yrs.									
66	m	66	Rheum. 10 yrs.		yes.	yes.	3 wks.							yes.		
67	f	59			yes.	years.	years.	yes.	yes.			yes.				
68	f	35	Phlegmonous erysipelas, 9 mos.	none.	1 yr.	1 day.								yes.		
69	m	48	Rheumatism, 6 yrs,		9 wk.		15 mos.				yes.	yes.		yes.		

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	nose, 4 wks.		vigil.				Night terrors.	
					1 day.		Chills, 2 weeks. Sore throat.	
						11 ds.	Jaundice, 7 days.	
		3 wks.			1 day.			Aortic aneurism.
		4 ds.			1 day.		Præcordial pain, 4 months.	
				2 ds.	3 ds.		Thirst.	Œdema of brain, and small tumor of brain.
	nose, 10 wks.						Weakness, 5 months.	
							Ascites.	Mitral stenosis.
					1 day.			Endocarditis. chronic.
		5 ds.	vigil.				Weakness, 2½ months.	Acute pleurisy.
							Thirst. Sore throat, 1 week. Pain in side, 3 days.	
	nose, 10 wks.	3 ds.	sopor. 2 wks.			10 ds.	Thirst, 10 weeks+ Epigastric pain.	Aortic and mitral disease.
	nose, 4 yrs. stomach, do.					yes.	Neuralgia. Paræsthesia. Indigestion, 2 mos.	
4 wks.		2 wks.						
	nose always. lungs.	2 wks.	sopor. 4 ds.				Epistaxis, finally several daily.	
	bowels, 1 wk.		vigil.	5 ds.	1 day.			
	bowels.			1 day.			Thirst, 8 months. Paræsthesia (sense of cold), 11 weeks. Weakness, 14 months.	
			sopor. 18 ds.	yes (3).	yes.			
24 ds.					1 day.		Paræsthesia.	
			vigil.		1 day.	1 day.		
	nose, 2½ wks.				1 day.		Very weak, indigestion.	
			vigil.		3 ds.	3 ds.		
10 ds.	brain.				3 ds.			Cerebral hæmorrhage.
		3 mos.		2½ yrs.			(8–10 "uræmic" attacks.)	
	lungs, 5 wks.		vigil.				Abdom. pain, 3 weeks.	[No phthisis.]
?							Tinnitus.	Cerebral softening.
			vigil.				Indigestion, years.	Acute pneumonia.
	lungs, 3 mos.					2 mos.	Syncope and staggering, 18 weeks.	
		3½ wks.						
		3 wks.				3 wks.		
	lungs.		vigil.				Mental weakness.	
		2 ds.	sopor, 2 mos.				Indigestion, 4½ mos. Cheyne-Stokes resp.	
5 mos.	brain.				2 ds.		Cheyne-Stokes, 2 days.	Cortical hæmorrhage.
					1 day.		Jaundice.	Catarrhal gastro-duodenitis.
					1 day.			Cancer of liver.
5 wks.								Acute broncho-pneumonia.
	lungs, 10 wks.		vigil.					Pneumonia, gangrene lung.
	nose, 4 ds.		vigil.				Brick-dust sed.	
							Indigestion, 10½ weeks.	Cancer of Stomach.
5 yrs. and 3 ds.					3 days.		Orthopnœa, 7 weeks. Cheyne-Stokes.	2d hemiplegia.
		1 wk.		6 wks. (and 5 since.)	1 wk.		Itching, 2 weeks.	
						2 wks.		Tuberculosis lungs & intestine.
							Itching, 6 weeks.	Rupture, aortic aneurism.
		1 day.			years.		Thirst.	
	lungs, 4 ds.							Acute pneumonia.
						1 day.	Syncope.	
		12 ds.			6 wks.			

31	m	44	Epilepsy from childhood. Rheum. 30.	much.		6 wks.							7 mos.			
32	m	51	Rheumatism, 10 yrs.			2½ mos.	2½ mos.		8 ds.	yes.		yes.	6 wks.			
33	m	43	Rheumatism, 18 yrs. Malaria.			1 wk.			1 wk.							
34	f	38	Erysipelas, 7 yrs.			1 mo.	10 wks. +	10 wks. +	10 wks. +	10 wks.		10 wks.		1 mo.		
35	f	55	Rheumatism, 35 yrs.		2 yr.	"years."	3 mos.	1 year.	2 ds.	2 mos.		2 mos.				
[illegible]	m	60														
37	m	26	Malaria, 10 yrs.	mod.	2 d.	yes, paroxysms, 9 wk.	9 wks.	9 wks.	9 wks.	always. worse 9 wks.	7 yrs.	yes.		4 yrs.		4
38	m	33		none.		yes.		yes.	3 wks.							
39	m	46		mod.	5 mos.	14 mos. orthopnœa & choking.	6 mos.	14 mos.	6 mos.				6 mos.	6 mos.		
40	m	60			yes.					years. severe 18 ds.						
41	m	75		mod.	7 wk.		yes.			2 yrs.			yes.	2 yrs.		
42	m	53	Rheumatism, 20 yrs.	yes.					2 wks.				2 wks.	yes.		24
43	m	68		yes.		always.	3 mos.						1 day.	yes.		
44	m	35	Rheumatism, 20 yrs. and several since.	much.		4½ wk.		4½ wks.		4½ wks.			4½ wks.			
45	f	50	Rheumatism, 4 yrs.		2 mos.	yes.	yes. & expect'n.	yes.						yes.	yes.	
46	f	60	Rheumatism, 3 yrs.							10 ds.						10
47	m	17	Rheumatism.	yes.	3 mos.				yes.	yes.			Const'p.	yes.		
48	m	32	Rheum. "years." Syphilis.	yes.		17 wks.	17 wks. & expect'n.			yes.			Const'p.	yes.		
49	m	68		yes.	4 wk.	15 wks.	4 wks.	15 wks.				yes.	20 yrs.			
50	m	62	Malaria, 20 yrs. Rheumatism.	mod.			3½ mos.		years.					20 yrs.		
51	m	37			4 wk.	18 wks.	3 mos.		18 wks.		5 mos.	4 wks.				
52	m	76			yes.	3½ wks.	3½ wks.									
53	f															
54	m	54		much.	3½ mo.	3½ mos.	yes.									
55	m	59	Rheum. 16½ yrs. and since	much.	12 yr.	5 mos.		16 mos.	4½ mos.					3 yrs.		
56	m	59		yes.	5 mos.											5 m
57	m	43	Rheum. 10 yrs.	much.	1 yr.				2 wks.	1 yr. +			2 wks.			
58	f	53				yes.			11 mos.							
59	f	70							2 wks.							5 w
60	m	38		much.		4 wks.	2 mos.								9 wks.	
61	m	49		much.	3 wk.	4½ mos.	4½ mos.		4½ mos.							
62	m	61		much.					10½ wks.	yes.						
63	f	62			years.	years.	3 mos.		"always."		yes.			yes.		5 yrs
64	f	27							6 wks.	always.						3 c
65	f	36				5 yrs.	5 yrs.									
66	m	66	Rheum. 10 yrs.		yes.	yes.	3 wks.							yes.		
67	f	59			yes.	years.	yenrs.	yes.	yes.			yes.				
68	f	35	Phlegmonous erysipelas, 9 mos.	none.	1 yr.	1 day.								yes.		
69	m	48	Rheumatism, 6 yrs,		9 wk.		15 mos.				yes.	yes.		yes.		
70	f	64	Rheumatism.			years.		yes.								
71	m	62	Rheumatism, 6 yrs.			yes.	5 yrs.									
72	f	60	Rheum. "years."		2 yr.	"months."	"years." expect'n.		1 wk.						"weakness."	
73	m	58														4 mos
74	f	73				"months."	3½ mos.									2 w
75	m	40														3 yr mos. 3 d

							Ascites.	Mitral stenosis.
					1 day.			Endocarditis. chronic.
		5 ds.	vigil.				Weakness, 2½ months.	Acute pleurisy.
							Thirst. Sore throat, 1 week. Pain in side, 3 days.	
	nose, 10 wks.	3 ds.	sopor. 2 wks.			10 ds.	Thirst, 10 weeks+ Epigastric pain.	Aortic and mitral disease.
	nose, 4 yrs. stomach, do.					yes.	Neuralgia. Paræsthesia. Indigestion, 2 mos.	
4 wks.		2 wks.						
	nose always. lungs.	2 wks.	sopor. 4 ds.				Epistaxis, finally several daily.	
	bowels, 1 wk.		vigil.	5 ds.	1 day.			
	bowels.			1 day.			Thirst, 8 months. Paræsthesia (sense of cold), 11 weeks. Weakness, 14 months.	
			sopor. 18 ds.	yes (3).	yes.			
24 ds.					1 day.		Paræsthesia.	
			vigil.		1 day.	1 day.		
	nose, 2½ wks.				1 day.		Very weak, indigestion.	
			vigil.		3 ds.	3 ds.		
10 ds.	brain.				3 ds.			Cerebral hæmorrhage.
		3 mos.		2½ yrs.			(8–10 "uræmic" attacks.)	
	lungs, 5 wks.		vigil.				Abdom. pain, 3 weeks.	[No phthisis.]
?							Tinnitus.	Cerebral softening.
			vigil.				Indigestion, years.	Acute pneumonia.
	lungs, 3 mos.					2 mos.	Syncope and staggering, 18 weeks.	
		3½ wks.						
		3 wks.				3 wks.		
	lungs.		vigil.				Mental weakness.	
		2 ds.	sopor, 2 mos.				Indigestion, 4½ mos. Cheyne-Stokes resp.	
5 mos.	brain.				2 ds.		Cheyne-Stokes, 2 days.	Cortical hæmorrhage.
					1 day.		Jaundice.	Catarrhal gastro-duodenitis.
					1 day.			Cancer of liver.
5 wks.								Acute broncho-pneumonia.
	lungs, 10 wks.		vigil.					Pneumonia, gangrene lung.
	nose, 4 ds.		vigil.				Brick-dust sed.	
							Indigestion, 10½ weeks.	Cancer of Stomach.
5 yrs. and 3 ds.					3 days.		Orthopnœa, 7 weeks. Cheyne-Stokes.	2d hemiplegia.
		1 wk.		6 wks. (and 5 since.)	1 wk.		Itching, 2 weeks.	
						2 wks.		Tuberculosis lungs & intestine.
							Itching, 6 weeks.	Rupture, aortic aneurism.
		1 day.			years.		Thirst.	
	lungs, 4 ds.							Acute pneumonia.
						1 day.	Syncope.	
		12 ds.			6 wks.			
		5 ds.						Acute pneumonia.
4 mos. and 2 wks.					2 wks.			Cerebral hæmorrhage.
			vigil, 3 mos.			1 day.	Weakness, months.	Chronic valve disease.
3 yrs. 9 mos. and 3 ds.								Cerebral hæmorrhage.

XUM

the present changes in practice are such as to be directly opposed to the collection of useful knowledge on this subject. The number of men who take care of one generation through its life-time is to-day smaller than it used to be, and those who take care of two generations of a family hardly exist. Certainly it is from the inherited condition that we must seek to study these symptoms. A person who is unfortunate enough to be born of parents who have bequeathed to him a gouty diathesis, such a person can be said to be a subject from birth for the prodromal symptoms of Bright's disease, and it is in studying him from his early years down through his adolescence into middle life that we get at the real and best lesson upon this subject. Now, as I said, this opportunity is becoming less frequent, as years go by, except in the records of life insurance.

Those, again, who have been exposed to poisons, such as lead and arsenic, may be suspected of exhibiting the prodromal symptoms of Bright's disease. Then the class of people who by virtue of their occupation are exposed to sudden changes of temperature, may justly be suspected of presenting the prodromal symptoms of Bright's disease. Then we have also that class of cases where there has been defective nutrition, either owing to unsuitable nutriment or to some inherited defect in digestion. All such persons, we may legitimately suspect of exhibiting to us, or about to exhibit to us the prodromals of Bright's disease. This covers of course a very large class of cases, but they must be studied and be under long observation.

You all recall, doubtless, the attention given twelve or fifteen years ago to the question of arterio-capillary-fibrosis, and the work given to it by Mahomed of London. It seemed at the time as if this work was about to throw a great deal of light upon this whole condition of early Bright's disease, that we would be able to make a long stride in the direction of preventive medicine, and at least diminish the number of cases of advancing Bright's disease. That, at least, was expected from the use of the sphygmograph. Dr. Handfield Jones, in 1876, in an article published in the "Lancet," said if he were not afraid of the fate of prophets, he would like to point with pride to a not distant future when the patients, instead of waiting for a cerebral hæmorrhage, would present a pulse indicating an early stage of arterio-

capillary-fibrosis, and the doctor, by regulating the patient's diet, his mode of living, etc., would ward off the more serious consequences. But fifteen years have elapsed, and we have not reached that happy condition yet. Of course, the presence of increased arterial tension is a warning which we ought to recognize clinically by the finger, at least, and after having recognized it clinically we ought to make use of its recognition for the benefit of our patient, but one can hardly expect the results that were hoped for at that time, and certainly not from the sphygmograph.

While walking down the street this morning with a distinguished member of this Society, I asked him what he considered the prodromal symptoms of Bright's disease were. He replied, everything; meaning thereby all sorts of derangements, all sorts of symptoms indicating to the patient's medical adviser a departure from health, and which do precede organic changes in this disease. They should put us on our guard. And if a patient comes to us with general and vague symptoms, headache, polyuria perhaps, deranged digestion, etc., we must think of possible renal changes, present or to come. We must not in the absence of any other symptoms—albumen and casts in the urine, œdema, etc.—allow him to go off with the idea that there is nothing the matter with him, and that his health does not need any attention.

Dr. E. G. Cutler, of Boston:—I think Dr. Withington is to be congratulated on the interesting and successful manner in which he has presented his paper. The tabulated report which he has prepared from the hospital records is certainly a monument of labor, as I happen to know, having myself once prepared a table of that sort.

He places rheumatism amongst the prodromal symptoms of Bright's disease. It has never been my experience, so far as I recollect now, to see many cases where that was a preceding disease in patients outside of a hospital. My experience in the hospital has been so limited in this regard that I cannot speak from that. I was quite surprised to hear his statistics on that point. In regard to the acute cases, we all of us have very distinct impressions that it is a frequent cause.

Next to lead poisoning, I happened to see once or twice

as prodromal cause in the production of this disease, arsenical poisoning. I have seen some cases of arsenical poisoning which were followed by chronic interstitial nephritis. In one case the poison was administered by a cook in the family, and the fact was not suspected at first. The case was followed up for a considerable time. It never could be quite proved. The individual thus poisoned had acute Bright's disease, and a number of years later chronic interstitial nephritis was observed, and so the connection between the poisoning and the chronic interstitial nephritis was supposed to be maintained.

In regard to œdema, one who has examined a large number of cases for life insurance must, I think, be somewhat cautious in accepting that without other symptoms as an early symptom of kidney disease. It is seen so frequently. It has been my experience to observe it often in persons after middle life, *i. e.* 50 years old and older. Such a patient is more apt to suffer from œdema of his legs than not. I think that in the early days of my examining I used to find slight œdema over the tibia, and was very much frightened indeed. I seek for it in late years in every such case, and quite often find a slight amount of œdema. I think it is due to something apparently independent of the circulation, and is capable of a perfectly satisfactory explanation. Œdema of the face I am inclined to place more stress on.

With regard to the point of heredity raised by Dr. Shattuck, I know it is the case with the life insurance companies to place a great deal of importance upon the presence of the disease in other members of the family, and they decide in every case as to whether they will accept it or not largely upon the family history in that respect.

XUM

ARTICLE XV.

A CASE OF TRIPLETS.

By HERMAN F. VICKERY, M.D.
OF BOSTON.

READ JUNE 9, 1891.

A CASE OF TRIPLETS.

On April 14, 1891, I was called to see Mrs. H——, a native American lady, twenty-six years old, who had been married the 10th of the preceding September, and whose last catamenial period had occurred September 21 to 27. I found her with marked œdema of the lower extremities and the walls of the abdomen, and some puffiness of the hands. The swollen flesh had a translucent look, suggesting to my mind the presence of some unusual complication of the pregnancy which her husband told me existed, consisting either in a disturbance of the heart, or more likely the kidneys. Indeed, on examination of the water, there was found to be a trace of albumen, and a considerable number of hyaline and finely granular casts, the specific gravity being 1020. The heart seemed normal. The abdominal walls were not only œdematous, but very tense; and palpation, while it revealed a uterus larger than would have been expected, did not enable me to discover any fœtal parts; nor upon careful auscultation over both the lower and upper portions of the uterus, was I then or at any subsequent time able to hear a fœtal heart. On digital examination, which the anasarca rendered somewhat difficult, I felt a fœtal head presenting. The patient even at this time complained of recurrent uterine pains. Under what I deemed appropriate treatment, the pains diminished, and the amount of urine reached three pints, with a specific gravity, however, of merely 1008.

At this time I myself experienced a fortnight's illness, and the patient was not seen either by myself or any other physician. On the morning of May 9, however, I was summoned, because spontaneous rupture of the amnion had occurred. This was on the 224th day after the cessation of the menses, or roughly seven and a half calendar months. I found the patient, who is a slight woman, very œdematous, the abdomen extremely distended, the vulva so swollen that examination with a single finger was very painful to her and difficult for me. It was a vertex presentation. As already explained, no fœtal sounds could be heard anywhere, although they were sought for under the impression that the pregnancy might be multiple. Fearing the subvention of eclampsia as a result of the nephritic disturbance, I gave at intervals of fifteen minutes three doses of fifteen grains of chloral, and also of bromide of sodium some seventy grains in all.

The dilatation of the os was tedious, for the womb seemed too distended to contract forcibly, and moreover the bag of waters had been ruptured. Toward noon, however, the pains in spite of the chloral had become very trying to the patient, and ether was now administered during each pain, but not to the point of narcosis. At two o'clock of the same afternoon, the os had dilated almost completely, and lest the patient should become exhausted, and also for fear of convulsions, I resolved to empty the womb. Under complete anæsthesia, the forceps brought easily into the world at about half-past two a female child; but after its birth, the womb was still much distended, and an amniotic sac was found presenting at the os, through which a second vertex could be felt. Upon the rupture of this bag, however, a pair of feet enclosed in a third sac displaced the head. This third bag being ruptured and a second little girl easily delivered, the third child, also a female, was extracted with the forceps, the occiput being posterior (face

to the pubes). As the placenta did not come away readily and I feared to prolong the anæsthesia, I introduced my hand into the womb and withdrew a very large placenta, which was unfortunately burned before it had been thoroughly examined. The œdematous tissues of the vulva were slightly torn. This seemed to be due more to their pathological state than to the size of the children or any undue haste in delivery.

The mother's convalescence was favorable, although she has not yet at the end of a month recovered her full strength.

The three little girls were perfect in every way, and each weighed four pounds. The amount of amniotic fluid in the two sacs artificially ruptured was considerable. The mother's ordinary weight before marriage was one hundred and five pounds. The little ones were wrapped in cotton batting, warmly covered, and placed in a temperature of about 80° F. Only one of them developed any propensity for nursing, and it was necessary soon to put her upon artificial diet, as the mother's milk proved very scanty and soon disappeared. It perhaps is pardonable briefly to relate their further history. Although very urgent advice was given with regard to keeping the children continuously warm, they were more than once allowed to become chilled, and from the time of one such occurrence the second of the triplets seemed permanently weaker, gradually failed and died on the 22d day after birth. For the last fortnight the little ones, including this weaker one until she died, have been kept in a large, uncovered square box very thickly padded with cotton, and containing three large hot water bags, which are changed once in three hours. The father's circumstances did not permit of his obtaining the *couveuse*, so-called, which is expressly adapted for the holding of such delicate children.

The diet has been Anglo-Swiss condensed milk, put up in Switzerland, one part, lime water two parts, plain water

nine parts, and with the addition at each feeding of one drop of pure cod liver oil. The children have not vomited; they have not seemed to suffer from colic, and their stools have been fairly normal. They have not gained in weight.

In January, 1890, Dr. C. M. Green, of this city, reported a case of labor with triplets at full term [Boston Med. and Surg. Journ., Vol. CXXII., p. 245], in which a diagnosis of multiple pregnancy and possibly a case of triplets was made by a student of the Harvard Medical School before delivery; but in the case which I have reported it does not seem to me that any positive diagnosis could have been made, but only an inference based upon the disproportionate size of the abdomen, and this I felt at the time might be due to an ascites having added itself to the pregnancy.

ARTICLE XVI.

PESSARIES: THEIR USE AND ABUSE.

A DISCUSSION.

BY

Drs. C. M. GREEN, of Boston.
EDWARD REYNOLDS, of Boston.
LEONARD WHEELER, of Worcester.
W. M. MERCER, of Pittsfield.

JUNE 9, 1891.

PESSARIES: THEIR USE AND ABUSE.

Dr. C. M. Green, of Boston, in opening the discussion, called attention to the definition of the word pessary as given in "The Century Dictionary," namely, that it was an instrument made in various forms of elastic or rigid materials, and worn in the vagina to remedy various uterine displacements. He hoped to impress the fact that the pessary was not an instrument to remedy a displacement. He would give the following definition: that it was an instrument made in various forms of elastic or rigid materials, and worn in the vagina as a splint or crutch to hold, as near as may be in normal position, the uterus and incidentally the ovaries and vagina in some instances after these organs have been restored to their normal relations.

In case of prolapse of the uterus, where the prolapse was of the first degree or slight, he did not use a pessary, but endeavored to diminish the weight of the uterus, which was heavy perhaps from subinvolution, by the use of the hot douche, of tonics, etc. It was sometimes necessary to use pessaries in hard-working women, since they could not conform their lives to the requirements of the best treatment for such cases. He spoke briefly of the various forms of uterine displacement in which a pessary might prove useful, and exhibited various pessaries which he was in the habit of using.

It was an abuse of pessaries to use any form of hard pessary before the uterus was in its normal position, or when there was present any inflammation in an active or semi-active condition. There were cases, however, when the second condition was absent, in which he used a pessary in order to allow of the use of the hot douche. Sometimes he had found that after stretching adhesions and getting the

uterus partly up, there being no tenderness, a lever pessary of the proper shape and size could be safely used, and the vaginal douche employed.

Dr. Green, in closing, spoke at length of the importance of seeing to it that a pessary is properly cared for. He thought it should not be used in patients not sufficiently intelligent to realize this. It was important to have patients return at stated times in order to inspect the parts to see whether the pessary had produced any disturbance, and also to see whether the pessary had been well cared for and was in proper position.

Dr. Edward Reynolds, of Boston:—I find that with increasing experience I use pessaries less and less all the time, not only on account of the belief, in which I feel firm, that the danger of the abuse of the pessary by the patient's own neglect is an ever present one, and one which makes the pessary in the long run, and in the hands of most men, liable to do more harm than good; but essentially and primarily, on account of the belief which seems to me almost self-evident, that displacements of the uterus are not in themselves disease. They are only the physical signs of certain other pathological conditions, of which pain and exhaustion are the subjective symptoms. Where there is a displacement of the uterus it is either because the uterus is too heavy, or because there is something wrong with its supports and they are failing in their office. Under those circumstances the use of a pessary is an excellent temporary palliative, to be used while we are adopting, selecting, or even employing other means of treatment for the radical cure of the essential, diseased condition, which lies behind the displacement. I no not wish to undervalue for an instant the great usefulness of pessaries when restricted to their proper sphere as temporary palliatives to be employed while the essential condition is being treated, but I think that when we are confronted with a displacement which needs treatment, we ought, after the pessary has been put in place, to set ourselves in every case to the far more difficult task of discovering the reason why that uterus became displaced in the first place, and then address ourselves to the work of correcting that essential primary condition. It may be that the uterus is heavy from subinvolution, or from ex-

treme congestion, passive or active; it may be that some solution of continuity after child-birth has destroyed the efficiency of its supports; or it may be they have merely lost their muscular tone. Such conditions should be sought for and the appropriate treatment adopted. In short, the point I wish to make is briefly that no one should regard a pessary as a curative, but simply as a temporary expedient.

I think that the essential precaution in the use of a pessary is to employ it, as Dr. Green said, only in intelligent patients, and to read to each patient who has a pessary inserted, a clinical lecture on the dangers of pessaries and on the absolute necessity of having them inspected frequently. My own rule is to direct every patient to come to me after her catamenia each month, have the pessary removed, washed, and if necessary changed.

As regards the choice of pessaries, I confess that the insertion of an instrument maker's pessary is to me like selecting ready made clothing by lot, to fit men of different sizes. I do not know that I ever inserted a pessary without altering its shape to fit the individual vagina, and I do not believe that a routine use of the pessaries made by instrument makers, is likely to be followed by much benefit. The patent process pessary shown by Dr. Green can be easily moulded, and the various small gas burners which yield a blue flame, furnish quite sufficient heat to mould a hard rubber pessary with the greatest ease.

I think the essential point is to make the pessary a small one. When one has learned to use a pessary so small that the finger will pass on all sides of it, it is surprising to see how efficient it is; and it is also surprising to see how the percentage of injuries from pessaries decreases when one learns to use a small pessary which is retained in position, not by exerting pressure on the surrounding tissues, but by its adaptation to the shape of the individual organs. I think the second point to be observed in fitting a pessary is not to make the upper arm of a lever pessary too long or too highly curved. In my own experience the chief injuries have come from overlong and overhighly curved lever pessaries. They do not act any more efficiently and they are certainly far more dangerous.

As regards the forms of displacements which should be treated by pessaries, I believe with Dr. Green that they are

very rarely, or never, necessary in anterior displacements, with the single exception of the palliation of mild cystocele in patients who cannot, or will not, submit to operation. There I think the cradle pessary is sometimes valuable as a palliative, the patient understanding that it is not the best treatment, and is only adopted on account of her refusal to submit to operation.

As regards the abuse of pessaries there is one thing which is too often neglected, and which is of great importance. I think that some among the many nervous troubles of women are often rendered very much worse by the insertion of pessaries. The point is perhaps prominent in my mind at this moment on account of my having recently seen two or three cases in which neurotic women had been maltreated by the use of pessaries which they confessed themselves kept them in a state of undue sexual excitability, and everyone should estimate the nervous system of a woman in that respect before he inserts a pessary, though I think such a result is often due to the insertion of too large a pessary, and would not follow the use of a properly fitting instrument.

Dr. Leonard Wheeler, of Worcester:—There is a degree of mystery attending the use of pessaries just as there is upon the subject that we discussed before this, the narrow pelves, and I think the mystery is owing to the same reason,—a lack of knowledge. We lack a knowledge of the pelvic measurements, and the labor in them is mysterious and in a dark country. In the use of pessaries we lack a knowledge of the pelvic contents, of their normal anatomy, and the use of the pessary is equally mysterious. It is not until very recent times that we have had any adequate idea of the normal anatomy of the pelvis, the unimpregnated pelvis. The pictures we had in our text-books and still have represent a most fantastical arrangement of things, quite different from what anybody can convince himself of by feeling inside the pelvis. We take the picture from the books and carry it in our minds and we are confused. It is only within a few years that Schultze's picture of the normal pelvis found its way in our text-books, and that is the first one that is right. If we have that in mind it seems to me that the trouble in the very much vexed question of anteversion and flexion quite disappears. You

cannot have an abnormal anteversion or flexion without surgical operation. The uterus lies flat on the anterior vaginal wall, except that the filled bladder lifts it off. It can't antevert any further unless you do something to get rid of the anterior vaginal wall. Dr. Green speaks of prolapse with anteversion. I tried to think of something to picture that as he was speaking. It would be very much like a man on horseback, the horse sitting on his haunches with his fore legs extended in the position the horse is when he lies down. The man can't go over his head in that case. He goes off the other way, and the uterus will slide off the anterior vaginal wall and tend to retroversion, but can't antevert. The only way in which you can get apparent anteversion of the uterus is by shortening the sacro-uterine ligaments; then you lift up the lower end and apparently you get a dropping of the upper end; and in the anatomy of the use of pessaries if you get the anatomical idea then the use of the pessary is founded upon something other than empirical rules. Now if we insert an Emmet pessary, what it does is to carry up the posterior vaginal attachment. It does not lift the retro-version, does not touch the fundus of the uterus; what it does is to lift the superior vaginal attachment and with it the cervix. The cervix lifted, the fundus falls forward, and if the fundus falls forward far enough for the impact of the abdominal contents to strike upon the posterior wall instead of the anterior, it will stay there. If the carrying up of the lower end of the uterus does not strike the upper end far enough forward to bring the impact of the abdominal contents upon the posterior wall, then it won't stay there, will tip over back and you have the condition of things that Dr. Green spoke of in the patient who comes in with a pessary inserted by another Doctor. Very likely it merely happened that the man who put the pessary in did not first replace the uterus to its normal position, or from some cause it could not stay far enough forward to keep the pressure of the abdominal contents upon the posterior wall of the uterus.

Dr. Reynolds spoke of the size of pessary. It seems to me a most important point to get it small enough. The temptation is always to use too large a pessary. It will cause pain. The number and kinds of pessary that I use myself is very small. It is generally the Hodge pessary,

more likely the Albert Smith, but the Hodge is the name of all the pessaries of that class. This is the one more commonly used where support is needed, where there is a dragging, and how often that is the case one can realize from the pad of cotton he puts in; and that leads me to speak of the size of the wad of cotton; for the same is true in regard to the wad of cotton; get it small enough. It is surprising what a small wad of cotton, that will fit in back of the cervix and give a little support there, will do for the comfort of many women. It would be better to begin with a small pessary and gradually increase it in size, than to work the other way.

As to the kind of material that is used. The hard rubber is perhaps the best material. After one learns how, it is easily moulded. But a very convenient form is the copper wire covered with soft rubber that you can easily bend into any form you wish, and having secured the right form with that material, send it to the instrument maker and have a hard rubber one made with that for a pattern.

For something to fill the vagina for a prolapse I use a hard rubber doughnut pessary, oftener than the one Dr. Green showed. There again the smallest one that will stay in is the best; but that is an unscientific thing to use, and is to be employed only where operation for some reason cannot be obtained.

Dr. W. M. Mercer, of Pittsfield:—There are cases of prolapse in old people that no form of pessary exhibited by Dr. Green will fit. In these people in poor circumstances who have to work and do a good deal of lifting, I have used the ordinary support much like McIntosh's with an abdominal belt and elastic coil. This is of course only a means of relief; the better kind would be a globular form in place of the cup. We have these cases where they cannot submit to operation, and where even operation would be doubtful to do very much good from the long continuance of the displacement.

ARTICLE XVII.

TYPHOID FEVER.

By WILLARD H. PIERCE, M.D.
OF BERNARDSTON.

READ JUNE 9, 1891.

TYPHOID FEVER.

TYPHOID or Enteric Fever, from the variety and severity of its symptoms and from the fatality which attends many of its epidemics, is one of the most interesting and important diseases with which we have to deal. The disease is of interest from two standpoints: first, as regard the theoretical problems of its bacterial origin, etc.; secondly, and that with which I shall most particularly deal in this paper, from its clinical aspect.

Typhoid fever was not treated of as a separate disease until the present century, and its personality was not generally accepted until about the middle of the century. Since that time much has been written on this subject by able and scientific observers, and, considering my limited means for accurate, scientific work, it may seem presuming in me to attempt to deal with the subject. Nevertheless, as my clinical acquaintanceship with the disease has been considerable, and in carefully observing its course and termination certain beliefs have forced themselves upon me which are not in exact accord with the writings of many standard authors, I may be pardoned for presenting them for consideration.

The correct answer to the question "What is the exact etiological factor which produces the disease known as typhoid fever?" would be of more value than volumes written upon pathology and treatment. But, as a matter of fact, we do not know the exact nature of the poison which produces

this disease. One thing seems to be established, namely, that the germ finds its best abiding place in decomposing animal matter. But I believe that it does not originate from the contents of cesspools and sewers, but in them finds the proper soil to develop its specific properties of producing typhoid fever.

The disease under discussion is eminently a disease of civilization. When a country or section of a country is first settled, malaria is the disease which predominates. But, as time goes on, and the accumulation of decomposing organic matter increases, the proper soil is made for the development of the typhoid germ, and malaria is displaced and enteric fever gradually becomes more prevalent.

In the recent epidemic which occurred in my vicinity the cause could be, in most instances, traced to the contamination of the drinking water by water closet sewerage. But there were hardly two cases which could be said to have received their poison from the same source. It seemed in some way the germs were disseminated through the air, but produced no disease except where they were first combined with decomposing animal matter, and then found their way into the drinking water of the unsuspecting victim. The increased prevalence of the disease in the autumn is undoubtedly due to the fact that the germ, wherever it may exist, becomes dried by the heat of summer, and, in this condition, is easily carried through the air, and, having been combined with the proper reagent, so to speak, is rendered active and capable of producing a specific form of fever.

My first practical knowledge of the manner in which typhoid fever is propagated was gained while a student in Burlington, Vermont. This beautiful city with its perfect system of drainage (it being located on a hill-side), would seem to be a spot where one would be safe from the ravages of the typhoid germ. But, looking more closely, it

would be seen that all the sewerage of the city was emptied in Lake Champlain and the water supply for the inhabitants was pumped out less than one half a mile from the opening of the main sewer.

Now, the fact that the people had for years been drinking diluted sewerage, and had not had typhoid fever, goes far to prove that the germ does not originate, *de novo*, from organic impurities. But, in the summer of 1884, a case of this disease was imported, and in the space of a few weeks a terrible epidemic swept through the city, causing the loss of many valuable lives. Of course, many examples like the above are familiar to you all. One of the most recent is the epidemic in Philadelphia, where since January 1st, there have been about 1500 cases, with 311 deaths;—the cause being, undoubtedly, the drinking of the sewer polluted water in combination with the typhoid germ. In giving the result of my clinical observations, as to the immediate cause of typhoid fever, I would say, that I believe the disease is caused by a specific germ, but that this germ is not capable of producing the fever when first derived from the typhoid patient, but must undergo a change resulting from its combination with some substance found in decomposing organic matter.

Now, if this hypothesis be true, a great majority of cases of typhoid fever might be prevented by laws, giving the Board of Health in every community the power to compel every householder, whether in city or country, to see to it that the sanitary conditions are such as to render it impossible for drinking water, or food, or air to be contaminated with the emanations from the water closets or sewers. It certainly is the duty of every one of us to instruct those under our care in the matter of sanitary arrangements, so that there may no longer exist, as there now does in a surprising number of cases, an almost direct communication between the well and the cesspool. This part of the sub-

ject is to be ably discussed in another department, so I will leave it with this brief allusion to the really most important part of the study of typhoid fever.

In discussing the DIAGNOSIS of enteric fever it can be said that, in many cases, a positive diagnosis cannot be made during the first, and, often times, until the second or third week of the disease. The fever often departs from its typical course, and we must ever be on the alert and cautious as regards our diagnosis during the early days of a continued fever.

We often hear it said by the laity and sometimes, I am sorry to say, by members of the profession, that a simple "slow" fever has "run into" a typhoid. Of course a typhoid fever is typhoid from beginning to end.

Cases pass through their whole course without eruption, delirium, tympanites or iliac tenderness, and yet suddenly die from hæmorrhage, and the autopsy shows the typical lesion of enteric fever.

In illustration of this part of the subject, I will report the following cases which occurred in my vicinity last fall.

The first patient whose case I will present was a laboring man about fifty years of age. My first visit was during the month of July, and the only symptoms were that he felt "weak and run down," as he expressed it. His temperature was normal, pulse 80, tongue lightly coated, bowels badly constipated, no appetite, urine high colored but normal in quantity. Surface of the body free from eruption. No case of continued fever had been under my observation for months. The man continued in practically this same condition for two weeks. He was able to be about the house and did some light work.

At the beginning of the third week a slight temperature showed itself, and, after two or three days, ranged 104° in evening and 102° in the morning. There was no diarrhœa, laxatives being necessary throughout the whole

course of the disease. No tympanites, no delirium and no iliac tenderness.

I should have been obliged to show my ignorance of the nature of the malady, by calling the case one of "slow" or "bilious" fever (which, by the way, means nothing), had not the typical typhoid eruption shown itself at about the fourth week of the illness. Several successive crops appeared, demonstrating the nature of the fever.

The fever disappeared at the end of 42 days, counting the two weeks during which there was no rise in temperature. The man made a slow recovery. In this case there were absolutely no symptoms showing the disease to be typhoid fever until the eruption appeared, yet, given the proper soil in which to develop, the germs given off in the dejections from this patient might have produced an extensive and fatal epidemic of enteric fever. Our unfailing rule in cases of fevers, therefore, should be to thoroughly disinfect all discharges, whether or not the exact nature of disease be evident at first.

A second case I will briefly report here to show the unsatisfactory condition of our knowledge of continued fevers.

A man aged 40, newspaper editor. Had suffered more or less from attacks of malaria for two years previous to this illness. I was first called to him in August last, and, at my first visit, found an afternoon temperature of 104°; rapid pulse, loss of appetite and feeling of general *malaise*.

The patient was put in bed, on a milk diet, and full doses of quinine administered, with the idea that I had a case of intermittent to treat. The temperature, of course, was for a few hours lowered, but soon mounted up to a higher point than ever. The quinine had no effect on the course of the disease, although it was given a thorough trial.

This patient continued for six weeks, with a fever ranging about 104° in the evening and 102° in the morning. There were no symptoms to indicate the exact nature of the

fever. All the typical typhoid symptoms were absent except the curve of the temperature, which followed about the prescribed course. Yet, what was the disease from which this man suffered and barely made a recovery after one true relapse (caused by an error in diet) and a protracted convalescence? It certainly was not a true intermittent or remittent fever. Three physicians were called in consultation, and one said the case was remittent; one that it was typho-malarial, and one that it was a bilious fever, whatever that may be.

This case serves to show in what a dilemma I, at least, find myself in the diagnosis of a continued fever possessing no distinctive symptoms. And these kinds of fevers are much more common than I believed while listening to didactic lectures or reading the accurate descriptions of the text books. I will cite one more case in this line.

This case was reported to the Franklin District Medical Society by Dr. N. P. Wood of Northfield, and the notes of the same have been kindly loaned to me. I will report in the doctor's own words:

"August 29, 1888, I was called to see Mrs. R. S., aged 42, married. She gave a history as follows: Had complained of general *malaise* for nearly a week; headache, loss of appetite, loose bowels and somnolence. I found her with a slightly coated tongue, anorexia, headache, but temperature and pulse normal. Her bowels moved from one to three times daily, while her usual condition was constipated. Color and odor of stools were normal. She said she had had similar attacks and usually recovered in a few days. Prescribed sponge bath and bitter tonic.

"In two or three days the headache, somnolence and loose bowels disappeared, but the anorexia, coated tongue and *malaise* continued.

"There was absolutely no tympanites, no tenderness over the abdomen and no rise of temperature. This con-

dition continued about ten days, when I discovered the typical eruption of typhoid fever on the abdomen. This eruption continued in successive daily crops for about ten days more. This general condition lasted until September 22, (she was first seen on August 29), when she began to improve and went on to recovery in about the usual way after typhoid fever.

"Not once during the course of this sickness did I discover any departure from a normal temperature."

Dr. Wood reported another case which followed about the same course as the above, absence of a rise of temperature, etc. This patient died from the severity of the attack, and the autopsy showed the unmistakable typhoid lesion.

Now in my experience, the cases which are called atypical are more numerous than those which correspond to the description given in our standard text-books, and by medical instructors, as the usual course of the disease.

We who begin the practice of medicine to-day, have no method of learning the natural history of a disease but by the writings of those who have observed the clinical symptoms before us. One of two things, therefore, must be true: either typhoid fever has of late grown more mild and its symptoms more often depart from the supposed typical course, or else, we are dealing with a different disease. It seems that *writers* of to-day dare not depart from the older descriptions of the clinical history of typhoid, but I have *personally questioned* many physicians of extended experience and none of them are familiar with the symptoms (except in rare cases) as we are taught to look for them. During the past season I was brought in contact with much more than the usual number of cases which occur each year, but in only one instance did I observe what might be called a typical case. The symptoms most frequently absent are delirium, tympanites, iliac gurgling and tenderness, and, in many cases, the fever is not of a high range.

My conclusions in regard to this matter are these.

First: the disease now known as Typhoid Fever differs much from that described by the older writers, and the symptoms which were formerly thought to be invariable, are much less frequently present.

Second: the diagnosis of this disease is many times attended with extreme difficulty, and is generally impossible in the early stages.

Third: cases which seem extremely mild may suddenly develop dangerous symptoms, and the patient may die as a result of errors in diet or other indiscretions.

Fourth, and lastly: that much study is needed so we may properly classify fevers and avoid confusion.

I believe that from the study of bacteriology we shall eventually receive the required light on the subject.

Coming now to the TREATMENT of this protracted and dangerous disease, it would seem that some radical measures must be instituted to destroy its activity.

But, although in no other disease with which we have to deal is the constant and careful attention of the physician more necessary, yet, I am moved to say, in no other malady is injudicious and indiscriminate use of drugs more productive of harm than in typhoid fever.

The patient must be under our watchful supervision, but, instead of standing ready to pour the heaviest guns of our medical battery upon the advancing disease, we should carefully watch the teachings of that almost unerring guide, *Nature*, and assist her with the most gentle means at our command. First, and most important of all, is the dietetic part of the treatment. Many cases need nothing more than rest in bed and a proper regulation of the diet. I would say here that in all cases the patient should not be allowed to be out of bed.

What is the proper diet for a typhoid patient? This is a

most important question, and one much discussed. There has of late arisen a belief among a part of the profession (and, among these, many of our eminent men), that a more "liberal diet" should be allowed; that many patients die from lack of the proper amount of nourishing food. The patient is, therefore, given beef and mutton broths, and, indeed, solid animal food; also many other kinds of solid food.

In my opinion there are radical objections to this method of feeding a fever patient.

First: it is a physiological and clinical fact that when the temperature is above normal, the digestion of animal food goes on slowly, and, where the temperature is high, is not performed at all.

Second: there is formed a large, partly digested mass of fæcal matter acting as an irritating, foreign body, augmenting the fever and other symptoms of the disease, and requiring for its expulsion an extra effort on the part of the already over-taxed powers of nature.

We are dealing with a disease whose primary lesion is in the intestinal canal, and the ideal food is one which will be most completely digested by the stomach and form the least waste matter. Now, we have just this ideal food supplied us in good, fresh cow's milk. And I believe clinical experience bears me out in saying that the best results are obtained by its judicious use.

I say judicious, for the well being of the patient depends, not upon the amount of milk *exhibited*, but upon the amount which is *digested* and *assimilated*.

And here, I believe, is the explanation of the ill results obtained by some physicians. A rule has been given that every patient must receive from three to six pints of milk in the twenty-four hours. So this exact amount is poured into the stomach without regard to its capacity for digesting it. Now, I have seen six ounces to be of infinitely more benefit to a patient than six pints would have been.

XUM

Our only *rule* should be to administer no more milk than can be readily digested and assimilated. The ill effect of animal food given to a seemingly mild case of typhoid fever, is shown by the following cases:

First, a young girl aged 12 years; had reached the fourth week of the disease, the temperature never having risen above 104°, and much of the time only 102° in the evening. No bowel symptoms. The parents thought it was time to give something more substantial than milk, so called in consultation a physician who was of the same opinion.

Scraped, raw beef, placed between two thin layers of bread, was given to the patient. Intense pain followed the ingestion of the food, and, for a time, it seemed that death would ensue as a result.

In about six hours, however, the offending mass was ejected from the bowels in exactly the same condition as when taken into the stomach.

Case No. 2 has been referred to in speaking of the atypical forms of the disease. The case had run on to the sixth week, and had begun to convalesce, when, without my knowledge, solid food, in the shape of scraped beef, was given to the patient. Great distress followed and the patient suffered a genuine relapse, keeping him in bed a month longer. The beef was passed from the bowels unchanged.

I might report many more similar cases which occur to me as I am writing, but these two serve as a type of the cases I have seen treated with the "liberal diet."

In regard to the use of alcoholic stimulants in typhoid fever, I would say that I believe many lives are saved by the timely use of whiskey or brandy. To be of value, though, they should not be given until the advanced stage of the disease is reached, and only then when the irregular, wiry or dicrotic pulse indicates the impending failure of the heart. Stimulants should then be used freely and fearlessly. If given throughout the whole course of the fever,

they prove of no value when we reach the real time of need.

In discussing the matter of treatment, nearly all writers consider the reduction of the temperature of the greatest importance, and base their prognosis upon, and derive their indications for treatment from the registering of the thermometer. Wilson in his great work says: "The main point in the management of Enteric Fever is to control the temperature." Bartholow, in his "Practice of Medicine," tells us that: "As the main point in the management of Typhoid is to depress the temperature, the treatment directed to that end is the most important." Dr. George B. Shattuck, of Boston, in the "Reference Handbook," comes at the matter a little more gently, and, in speaking of the management of the pyrexia, says: "An evening temperature rising above 103° F. suggests the propriety of interference." In the face of these names, I hesitate to express my views on the subject. But I will say this, that I believe he who constantly keeps the thermometer in position and depends upon that as his guide in treatment, is simply watching one of the necessary symptoms of the disease, and may not only overlook more important symptoms, but will be likely to do harm by the use of the powerful heart depressants which will produce at best but a transitory reduction of the temperature.

I do not believe in the general use of antipyretics in the continued fevers. All the remedies of this class are either primarily or secondarily powerful cardiac depressants. Therefore, in a fever of a typhoid nature, they are certainly contraindicated. The temperature is, of course, reduced; but, unless held down by repeated doses of the antipyretic, it will mount higher than before. The seemingly good effect produced by such remedies as Antipyrin, Acetanilide and Phenacetin is, I believe, due not to their antipyretic action, but to their analgesic effect.

XUM

They merely serve to mask the symptoms for a time, but it is impossible that they can serve as an anodyne to the conscience of the physician who fully understands their action, and who has in mind not altogether the momentary relief of a symptom, but looks much farther and seeks the ultimate good of the patient intrusted to his care.

A remarkable result from the use of digitalis in a case of typhoid is worthy of mention here. A boy, aged 11, had been suffering from an attack of the fever for ten days. The morning and evening temperature were nearly the same, having been running for six days at an evening temperature of 105.5° and a morning temperature of 104.5°. The pulse 140 and irregular. Digitalis was administered in the dose of one minim of the fl. ext. every four hours. After four doses of the drug had been administered, I was hastily summoned to his bedside and found him in a state of collapse, and the temperature during this time had dropped from 105.5° to 97.5°—a fall of eight degrees. The pulse was 40 per minute. I certainly reduced the temperature and pulse in this case, but never was I more pleased than when I was again able to see the temperature of 105.5° recorded. No more antipyretics were given in this case, which went on to a final recovery.

It may be proper to speak here of the use of the cold bath, although it is not correct to class this remedy as an antipyretic. The good results obtained by the use of Brand's method, or some modification of it, is most assuredly not by the antithermic effect alone, as some writers would lead us to believe, but by the energizing effect upon the nerve centres, produced by stimulating the peripheral nerves with cold water. The cold bath is of positive value in the treatment of typhoid fever, and the inconveniences and expense attendant upon its use should not cause us to withhold it from our patient, who stands in mortal danger and demands of us all possible aid at our command.

The method by which we may gain infinitely more knowledge of the patient's condition is by a careful observation of the *pulse*.

The time-honored habit of pulse study and pulse counting should not be neglected. For, by that best of all *sphygmographs*, the trained *finger tips*, a knowledge of the condition of the circulation, of the force and nature of the heart's action, can be obtained. Here we may get our indications for increasing the amount of food or for the administration of stimulants, and gain knowledge upon which to base our prognosis.

The thermometer is undoubtedly an addition to our armamentarium, but its use should not displace other methods of study which are really of more value. Various specific methods of treatment have been advocated from time to time, but, from our present knowledge of the disease, such methods can be of no scientific value.

When we become acquainted with the nature and habits of the typhoid germ, then we will have a foundation upon which to build a specific treatment. Many of the advocates of some so-called specific treatment claim excellent results, and it will be seen that many remedies are of much use. But it will also be seen that most of those drugs which seem to favorably modify the course of the disease belong to one class, viz.: antiseptics. A treatment originated in Germany in which mercury and iodine were the specific remedies. Excellent results were obtained from the use of these drugs, the temperature range and condition of the bowels being favorably affected.

I believe this good result was produced by the antiseptic action of the mercury and iodine. As I have said before, the primary lesion is in the intestinal canal. Here is where the typhoid germ is first deposited, and from the ulcerative process here developed is derived the secondary or pyæmic fever characteristic of typhoid. Now, the treatment which

will act as directly as possible upon the ulcerating Peyer's patches, is as near an approach to anything "specific" as our present knowledge will permit.

It now becomes easy for me to say that my method of treatment, after supporting the patient with the properly applied milk, diet and stimulants when indicated, is by antiseptics. By this I mean that the alimentary canal should be kept in an aseptic condition from the mouth to the termination of the intestine. Of this, the attention to the mouth is not the least in importance. Many remedies are suitable, and this gateway to the alimentary canal should be securely guarded, so that no septic matter can find its way into the circulation through this channel.

That part of the intestinal tract beyond the ilio-cæcal valve can be reached by antiseptic enemata, which should be used at least twice a-day.

Of the medicines to be administered internally, the mercurials are in the first rank. Tablet triturates of calomel, or bichloride, in very small doses, are the form used. The combination of carbolic acid with bismuth or iodine is valuable, especially where there are marked bowel symptoms. Pepsin is an excellent antiseptic, and, where the digestive powers are weak, aids in the elaboration of the food.

In speaking of the necessity for thoroughness in our treatment, I would say that our antiseptics should be continued until the dejections from the bowels are safely deposited where infection from them is impossible.

The results obtained by this method of treatment in a fairly large number of cases are these: the diarrhœa is much less, seldom requiring the use of opiates; the temperature range is not so high, and the tendency to complications is not so great. I do not believe any method of treatment now known will cut short the course of typhoid fever, but this method seems to me more rational than to

savagely attack one of the many symptoms which are, in most cases, the necessary accompaniment of the disease.

In regard to treatment, then, I have only attempted to show that a conservative method, based upon what little real knowledge we have of the fever, is of more value than the uncertain use of potent drugs which, while they for the time being seem to relieve one symptom, may do the patient positive harm.

It may be said that I have simply done the work of a vandal, and have destroyed the idols which have been so long worshipped, having substituted but little in their place. But I firmly believe that, not only in this, but in all diseases, the time has come when thoughtful physicians say that we must use less, much less, medicine, and when administered, it should be with a definite purpose in view and in the smallest possible dose.

Although we are standing on the verge of marvellous revelations as to the cause of disease, and in a quarter of a century from now this labored essay would not be worthy of your consideration, yet, at the present time, our best results will be obtained by making use of the first steps which have been taken in our knowledge of this disease, and being extremely conservative in instituting uncertain and unscientific measures.

And I believe that the greatest step that has been taken within the last decade is in learning what not to do; in learning to place less confidence in the curative power of drugs, and watching more closely the indications of nature, standing ready to render all needed aid.

Our typhoid patients' surroundings should lack nothing to render their sanitary condition perfect, and the supporting and absolutely antiseptic treatment should be untiringly pursued.

I can close this paper with no better words than those of the immortal Jenner. He says: "My experience has im-

pressed on me the conviction that the man will be the most successful in treating typhoid fever, who watches its progress, not only with the most skilled and intelligent, but also with most constant care, and giving *unceasing attention to little things*, and who, when prescribing an active remedy, weighs with the greatest accuracy the good intended to be effected against the evil the prescription may inflict, and then, if the possible evil be death, and the probable good short of the saving of life, holds his hand."

DISCUSSION.

Dr. E. N. Whittier, of Boston:—The burning question of to-day is found within the domain of preventive medicine.

Was it not Prof. Holmes who wrote,

> "To guard is better than to heal.
> The shield is nobler than the spear"?

We accept recent public works by sanitary engineers as evidence of the great advance made of late years in the desired direction of protecting communities from diseases which are most prominent because pernicious: I mean infectious diseases, a class wherein typhoid fever stands at the head, and the great work accomplished in the City of Boston, by its intercepting system of drainage, and that now so well begun by the Commonwealth in the Metropolitan system, are conclusive of the growth of public and professional opinion in the direction of preventive medicine.

I have listened with much interest to Dr. Pierce's timely paper, and note particularly his words of caution with reference to the employment of drugs and his remarks on the subject of high temperature in connection with typhoid fever, and I agree heartily with the reader as to the relative harmlessness of the one and the comparative uselessness of the other.

Nathan Smith well remarked that the best practice in the treatment of acute infectious diseases was fresh air freely,

pure water abundantly, and few drugs; and I am certain that as men advance in years and in experience this conclusion is usually attained.

Recently considerable attention has been given to the subject of remedies to correct intestinal fermentative processes, and to prevent putrefactive changes in the intestinal contents, in enteric fever. If "to guard is better than to heal," then the antiseptic and aseptic treatment of typhoid fever deserves the highest rank. "Hospital" rules bearing on the disinfection of bedding and clothing, such for instance as those posted in the wards of the Massachusetts General, are with difficulty applied to the varying conditions of private practice. When trained nurses are employed, the safe use of carbolic acid and corrosive sublimate solutions is assured, but in that class where typhoid most prevails, particularly among the operatives in our factory towns and cities and the families of laboring men, the use of carbolic solution 1–20, or of corrosive solutions 1–2000–5000 is open to serious objections by reason of the large element of insecurity; but it is not difficult to provide means for securing aseptic conditions of the dejecta, and of the bedding or clothing, by the very safe and efficacious chloride of lime and chlorinated soda preparations, familiar to all, and it should be insisted upon, that the chloride of lime in powder should be added to the dejections, well stirred and allowed to stand for some time, before being thrown into the hopper or better still buried, and proper precautional instructions should be given as to the strength of the solution for disinfecting bedding and clothing.

The good results following the use of intestinal antiseptic remedies challenge our attention and invite careful consideration of the reasons advanced for their employment, particularly with reference to maintaining aseptic conditions of the contents of the small intestine, and it is to this branch of our subject that I would invite your attention. The attempt to relieve intestinal flatulent distention by the passage of the rectal tube is almost invariably unsatisfactory, and aspiration not only fails of good effect even temporarily, but it has been found that rapid return of flatus frequently results in the escape of the contents of the intestine into the peritoneal cavity, inducing peritonitis of the most fatal form. It must have been noted by physicians with even moderate experi-

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ence in the observation and care of typhoid fever cases, that the fatal uncomplicated cases are almost always those in which intestinal distention is a prominent feature. This can arise from no other source than putrefactive changes in intestinal contents, and it must be conceded that this flatulent distention, often extreme, subjects the thoracic viscera, particularly the heart, to most embarrassing conditions of displacement and compression, whereby mechanical obstacles of the gravest import are added to conditions already unfavorable, which in the ordinary course of the disease are oftentimes with difficulty successfully resisted.

It is a well established principle in the treatment of typhoid that freeing the intestines from accumulations is the surest way of changing the conditions and the opportunities causative of flatulent distention. This is the reason for the use of laxatives in the earlier stages of the disease under discussion, as well as for such dietary restrictions in all stages as shall leave the smallest quantities to descend into the intestinal tube, either to be digested there or to remain indigested, or in any way to give occasion for putrefactive changes.

The corollary of these rules is the exhibition of remedies to arrest, delay or to prevent decomposition in the unavoidable contents of the intestines.

Flushing the colon, particularly in the cases where intestinal "torpor" results from apathy, as well as in the cases where constipation exists, is good practice. But we should also avail ourselves of the opportunities now presented in the modern internal antiseptic remedies to maintain as nearly as possible constant aseptic conditions of the contents of the small intestines, not only with reference to the destruction of the germ of typhoid, but also to prevent putrescent changes.

It would appear that intestinal contents can be rendered and maintained quite or nearly aseptic during the ordinary course of the disease, not only without harm to the patient, but to his very great comfort and advantage.

The mild chloride in the earlier stages is not simply laxative, it is antiseptic, and further on when ulcerative processes shut out laxatives, salol, salicylic acid, and its compounds, creasote, sodic sulphite, napthol, napthalin, or beta-napthol with salicylate of bismuth can be employed

with marked good results. These remedies should never be prescribed in pill form, but in wafers or in solution or emulsions.

But I cannot close my remarks without your permission to present what has been called "Statistical evidence in support of the claim of the Advanced School of Hydrotherapy."

I recognize the great obstacles in private practice to the rigid enforcement of the rules given by Brand as to the "Cold Bath Treatment of Typhoid Fever," but we must grant that from no other method have so great and so good results been obtained.

To tabulate the figures of Brand, Baruch, Delafield, and also those from large and carefully compiled reports in recent military hospital practice, will be to show a mortality in typhoid fever under the older methods of treatment of 28.1%; but the recent tables under a more or less accurate application of Brand's rules, show a marvellous advance towards freedom from fatality. Brand's earliest figures gave a percentage of mortality in 19,017 cases of 7.08%; later in 5,573 cases, 3.9%; Naunyn in 145 cases gives 6.9%; Vogel in 713 cases, 3.4%; still later Juergensen, Vogel, and Brand publish a record of 1,223 cases with a death rate of only 1%.

Other observers, and among these may be found men whose opinions are entitled to the greatest confidence, insist upon it, that there can never reasonably be expected to be any method of treatment which shall wholly eliminate the unavoidable per centage of 4.5% of fatal issue in typhoid fever from perforation (and its consequent fatal peritonitis), and from intestinal hæmorrhage, and while these observers seem prepared to admit that Brand's method does not materially increase the death rate from the pyrexial complications, pneumonia, empyema, and intra-cranial lesions, it is believed that there must remain in spite of the greatest care, the most intelligent supervision, and the strictest observance of the best rules, a mortality rate in typhoid fever of at least 7.5%.

Dr. C. C. Odlin, of Melrose.—It would be presumptuous of me to expect to be able to say anything which would add to your knowledge of the disease concerning

which so much has been written, and which has been so fully discussed, and an account of which has been so fully presented this afternoon. In fact, what has been said has left but very little indeed for me to say; but typhoid fever is a disease which is so constantly engaging our attention, so greatly exciting our anxieties, that we cannot know too much about it. It seems to me that since I graduated in medicine, now somewhat more than twenty years, the type of typhoid has changed almost entirely. At that time we got pretty severe symptoms in nearly every case that we saw. During the first week the patients were very comfortable; little tired, a little headache, and general malaise, but about the end of the second week we found them mildly delirious, becoming weaker, abdomen swollen, and so on. It is very rare for me to see a case of that kind now. Yet it seems important to keep in mind that there are certain cases which may perhaps lead to a mistake in diagnosis. I know it has several times occurred to me to treat as typhoid fever a case which I afterwards realized to be one of cerebro-spinal meningitis. A friend told me of a case of perityphlitis which had been treated as a case of typhoid fever all through the course of the disease. But leaving out the mistakes in diagnosis, how shall we conduct a case of typhoid fever to a safe conclusion? Our forefathers in medicine thought they knew how to treat typhoid when they bled, purged and salivated. They carried that treatment out with a vim. In fact, that method of treatment continued down to a period within the memory of some of our older members of this Society. But we have learnt that typhoid fever patients often die of starvation; that the disease is self-limited; that it is sure to get well provided the patient can be kept alive; and I think that most of the profession feels as one man that the patient will get well if he only lives long enough. Now, how shall we best keep him alive? It has seemed to me within the past few years that many physicians have felt that temperature and typhoid fever were synonymous terms, and that the main idea of treatment has been to pull down the temperature at all hazards.

As a result of that idea of treatment, we have the treatment by cold baths, which has been alluded to, but concerning which I have had no personal experience; then we have

the many coal-tar products, antipyretic in their character, and in my opinion not devoid of danger in their results. I feel we ought not to use them indiscriminately. Of course, if the temperature goes very high, so that we fear that we are getting heart paralysis, it may be necessary to give an occasional antipyretic, and, I think of the whole list of them, phenacetin is by far the safest. Another point is this: if we believe that typhoid fever is caused by a specific germ or virus, no matter how introduced into the system, is there any drug or combination of drugs that will render that poison inert in the system? It seems to me that there is such a combination. I know very well that a number of cases which have occurred in my practice, and in the practice of any ordinary physician, are far too few upon which to formulate an opinion; but for eight or nine years past I have used a combination of carbolic acid, iodine and alcohol, in equal parts, and have found it after a faithful and honest trial to be a good antiseptic medicine in this case. With it I have seen the pulse go down, the fever go down, and having failed to see a death from typhoid during that time, it seems to me that that combination of drugs is worth something. Lastly, it seems to me that if the lives of the patients in the desperate cases can be kept, if in my practice it has been due to anything, it has been to the unsparing use of alcohol. I mean alcohol in sufficient quantities to affect the pulse and with it the temperature. I have given to a boy 14 years old a pint and a half of brandy daily, for a number of days, with no bad effects, but with the happiest results.

But, whatever we do in typhoid, it certainly behooves us to remember what Watson has said in his work: "Let us remember to do no harm, knowing that in typhoid fever the physician is a good deal like the pilot of a boat; he cannot quell the storm, but with the exercise of good judgment he may bring the ship safely in port."

Dr. J. A. Gage, of Lowell.—I desire to say, regarding the paper read here to-day, that in the series of seven cases which I have attended to in hospital practice, all taking place in the same family, I have tried to make a careful study of the use of bi-chloride of mercury. In those cases I am inclined to think that it did benefit the symptoms, and

were I at present on the medical instead of the surgical side of the hospital, I certainly would give that drug a more careful trial.

When the secretary of the section wrote to me, he suggested that as I had come from the midst of a very important epidemic in the city of Lowell, I speak to-day about prophylaxis in cases of typhoid as applied to cities and towns; but I hardly think this is a place to discuss it in, because you are all very well informed on this point. But there are a few points I would like to speak of in connection with it, *i. e.* in regard to prophylaxis. We had an epidemic which had its height in November, and gradually declined till we reached our usual level about March, and this has been due to the most excellent work on the part of Prof. Sedgwick, who traced the whole thing to the direct placing of typhoid dejecta in a small brook about three miles above Lowell, and the entrance of the typhoid germs into our water supply. There are only two or three interesting facts in regard to the epidemic aside from the general history of it. Prof. Sedgwick has shown that over 1% of the population had typhoid fever within the first six months; that all ages, from infants in the nursery to old people—all kinds of people, criminals and paupers. Not a single case has occurred in the outlying district, Middlesex, from which place many people come into the city to work.

That leads to the question, whether to the city water of Lowell we must trace the high per centage of typhoid fever in Lowell as compared with other places, and also leads me to speak for a moment of the history of our city. Quoting back 53 years, the average death rate was 38 deaths in the year; in 1846, 101 deaths; in 1847, 95 deaths; and I also recognize in this regard that the means of diagnosis then were not as good as they are at the present time. There was an epidemic far exceeding the present one in its extent during that time, and then we had no city water. What were the conditions at that time? In 1872, when we put in our city water, we had 66 deaths, and the following year 56 deaths, and for the eight years following the introduction of the city water the death rate was low. I have no doubt that the city water is responsible for a great many of the deaths. But it is not responsible for the greater amount. In the city of Lowell we have 2600 privy vaults.

Now it is hardly fair to expect to trace typhoid fever to the drinking water with such a condition as this before us. If we put pure water tomorrow into the city of Lowell, we could not expect the death rate to decrease much.

Now, just for a moment, let us consider the theory of the origin of typhoid fever. It is held that we may have typhoid fever due to the presence of the germs of typhoid in the drinking water. On this authorities differ. I think we must at present recognize the fact that the disease certainly depends much upon the season, and we must expect typhoid fever germs to come to us from three sources: water, food or air. If we have pure water, this one source is eliminated. Then we must have pure food, we must have good milk. Then we must consider the air. Taking these three sources, what means can we employ to protect ourselves? I believe we must start with the individual case, the first case. If that case can be removed as a source of danger, the community is going to be protected. If the discharges of that patient from the start are rendered harmless, we need expect no further trouble. So, I think, we must impress upon our patients the absolute necessity for complete disinfection. To secure complete disinfection, I should say use nothing but the fire. After using carbolic acid and corrosive sublimate, you are not sure that all the germs are killed, unless they are in contact with the disinfectant a longer time than is usually allowed. I must say, in this regard, that among the poorer class of Lowell I have found that disinfection was not carried out at all in the majority of cases, and I do not believe but what there was 1% and over of the disease sent directly into the river for our friends at Lawrence to drink without any disinfection at all. Dr. Whittier spoke of the danger of leaving antiseptics with our patients; but I believe it is a greater danger not to leave them. I always give a patient's family, when such a disease occurs, corrosive sublimate, tell them the necessity for using it, and have it labelled in big letters, "POISON."

When it comes to the question of protecting the community from the disease, we must see that it has a pure water supply; by that I mean water that has not had sewerage poured into it at some place. I do not believe that there

is any filtering in existence that can assure us that we have pure water after it has been once contaminated.

In regard to milk, I think it is of the utmost importance that the milk supply of cities should be inspected. I believe that laws should be passed so that proper agents can have authority to go to the place where the milk is obtained, and see that everything is all right there.

In regard to the air as a source of danger, that is a long story, and I cut it short by saying we need proper sanitation. We need it particularly in my own city. We should do away with all vaults and such places. In my city, there appears to be much apathy among the people. They do not realize the danger from allowing these vaults to exist. I have been a member of the board of health of Lowell, and know what hard work we have had in this regard.

Then we must know further about the spores, whether there are any or not in this disease; whether, if present, they can lie dormant, and after a while grow again when under favorable conditions; and until we have such knowledge, I believe we shall not get rid of typhoid fever.

ARTICLE XVIII.

THE BACILLUS OF TYPHOID FEVER: ITS OCCURRENCE AND SIGNIFICANCE.

By JOHN A. JEFFRIES, M.D.
OF BOSTON.

READ JUNE 9, 1891.

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THE BACILLUS OF TYPHOID FEVER:
ITS OCCURRENCE AND SIGNIFICANCE.

In 1882 Ebert announced that certain groups or colonies of short bacilli could be found in the Peyer's patches, lymph glands of the mesentery, spleen and other organs of those dead of typhoid fever. Meyer reported shortly after on the subject, and added much weight by showing that such groups of bacteria existed in nearly all cases of typhoid fever. This was before the general use of aniline dyes and solid culture media.

Next Gaffkey showed that these groups of bacteria could be stained by long immersion of sections in solutions of methyline blue and washing in acidulated water. He also showed that the plant could easily be grown at room temperature, and that the cultures were quite different from any known at that time. The plant grew as a bacillus with rounded ends, was endowed with the power of motion, and apparently formed spores. Gelatine was never dissolved; the deeper parts of the shaft were beaded and slightly brown in color. The growth on potato was regarded as a diagnostic character, the peculiarity being extensive growth as shown by the microscope, yet nothing to be seen by the naked eye except a slight shimmer or difference in texture when looked at in a favorable light.

Koch and others soon demonstrated not only that the bacillus occurred regularly in all active cases of typhoid, but also that it could not be found in those dead of other diseases. This put the subject in such a position that a few

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years ago one spoke of the typhoid bacillus as quite a settled matter. To-day we do not know half as much as then. The very individuality of the plant has been questioned. The difficulty has come from the discovery that a large number of bacteria exist which grow on potato just like the typhoid bacillus, and that some plants identical in all the culture characteristics given by Gaffkey are not so very rare, and occur in the stools of people with intestinal disease. As a result, the Ebert bacillus has been cultured in a great variety of ways, and subjected to a very close scrutiny, in the hope of discovering some character or group of characters by which it could be positively recognized. So far all efforts have been futile. If Babes is correct in his observations, there are a host of other bacteria, either closely allied species or varieties, which occur in man and chiefly in man with typhoid fever.

Even yet the difficulties of the case are only half related; the Ebert bacillus is a protean form, and varies much in its shape, form and manner of growth, with minute changes in its surroundings, as temperature, degree of chemical reaction, and composition of the media. Therefore, to-day, to demonstrate that a bacillus is identical with Ebert's, it is necessary to compare it step by step, culture for culture, under precisely the same conditions with an undoubted culture, and to have derived the original supply from a case of typhoid.

The above conditions can be fulfilled in practically every case of typhoid fever which has died before the disease has passed off, and the original microscopic findings can be verified in the same way. Those conditions have never been fulfilled in a single case of other disease. We are, therefore, justified in claiming the existence of a peculiar bacillus or bacillus group in every case of typhoid. This is the ground on which the claim of the typhoid bacillus depends. It rests on the same evidence as the spirillum of relapsing

fever, the plasmodium of malaria; both are always to be found in their respective diseases, never in health or other diseases. It is, therefore, clear that the typhoid bacillus and typhoid fever stand in some sort of causative relation; things which vary together, are connected causatively. From analogy and the improbability that the bacilli are the result of a secondary invasion, the bacillus is commonly accepted as the cause of the disease. No careful student claims this as proved, neither is the law of gravitation.

A few authors have attacked the integrity of the bacillus, and argued that typhoid fever is a condition, and the bacillus in reality a variety of species, as in the summer diarrhœa of infants. Others hold that the plant is simply a modification of a common denizen of the intestine. But epidemiology and clinical study point so clearly to a specific disease transmitted from case to case that I do not think these views need be entertained, at least until their supporters produce some substantial evidence.

The distribution of the plant in the body bears a close relation to the nature of the disease. First, it occurs in the substance of the swollen Peyer's patches, before these have sloughed, not simply in the mucosa, but in the round cell aggregations. After the surface has become eroded and an ulcer is formed, the surface becomes literally coated with all sorts of bacteria, cocci, streptococci and bacilli; among the latter there is often a rather long bacillus, which Klebs at one time held to be the cause of the disease. Evidence, however, points to its being distinct from the typhoid bacillus. It only occurs on and in the surface of the erosions, not deep in the tissue. Nearly if not quite simultaneously with the appearance of the bacillus in the follicles, the lymphatics of the mesentery swell and show nests of the same bacillus. The nests contain from fifteen or twenty bacilli to hundreds, and form a mass varying in size from that of a nucleus to one very much larger. The

centre is apt to appear almost homogeneous or finely granular; but the circumference clearly shows short, straight, irregular-looking bacilli. The irregular appearance is due to parts of the bacilli staining less than the rest.

The spleen shows precisely the same state of affairs. According to the duration of the disease and other factors, the number of colonies varies greatly. In advanced cases, even two hundred sections may he examined before a colony is found. From this their prevalence runs up to as many as fifteen or twenty in a single section.

So far the colonies have been described as being in the tissue, between the cells, not as bearing any particular relation to the blood-vessels or other parts. To this the liver offers a contrast. Here the plant is apt to occur in the form of distinct thrombi, which have grown from minute emboli.

In the kidneys the colonies occur chiefly in the cortical portion; are often present, at times abundant, but apparently are not present with the same regularity as in the spleen.

Besides the above organs, the typhoid bacillus may be found in most any part of the body. Thus it is apt to occur in those cases of lobular pneumonia which so often complicate cases of typhoid. It has also been reported as existing in the meninges in cases of complicating meningitis, and in abscesses in such different parts of the body as the parotid glands and the tibiæ. At times the bacillus is found alone, but mostly in company with some accepted pus producing bacterium.

Numerous examinations of the blood in all stages of the disease have been made, and observers have reported positive results, especially from material procured by opening a rose spot. Others have failed. That the plant can occur in the blood, the emboli in the liver demonstrate; nevertheless, none of the observations are above question; many sim-

ply depend on the microscope and are absolutely worthless; others are supported by cultures, but in no cases have these been carried to that degree of fineness and accuracy necessary to establish even a probable diagnosis. Examination of the blood in doubtful cases for purposes of diagnosis is therefore a failure, and until our knowledge is greatly improved must remain so. Provided the typhoid bacillus was found, its positive recognition would require so much time that the practitioner would take but little interest in the result.

All the above remarks apply to the search for the bacillus in typhoid stools; it may be there or it may not. Many claim to have found it, many have failed. The difficulties are enhanced by the enormous number of bacteria in fæces, and the occurrence of many typhoid like bacteria in the intestines of typhoid patients. All sorts of ready methods of isolation have been recommended, but none have stood the test of time. The only feasible method is to make plate cultures from the stools and then search for the desired colonies. These have nothing characteristic about them, are variable, so that in searching for the typhoid baccillus plates of pure cultures of the typhoid plants must be made to serve as a control and comparison in each case. Even then the amount of error is large. Lately word has come that a regal road to the typhoid bacillus was found. All that is necessary is to use agar and put the plates in the thermostat, and presto! the next day, thanks to the warmth, the typhoid (pathogenic) bacteria have developed finely, while the others, not liking heat, are retarded in development. Beautiful, but mistaken. All or nearly all the germs in the intestines thrive better at 98° than at 68°. There is nothing new about the method except the theory; by it we hasten development, and avoid liquifaction: on the other hand we lose the signs of the only absolute fixed character, non-liquifaction of gelatine, and run a considerable risk of killing the plants we want to study.

Considerable attention has been paid to the urine in cases of typhoid, and the weight of evidence seems to indicate that the bacillus is quite liable to appear in the urine when it contains albumen, that is, quite early in the course of the disease. As yet, however, the universal doubt which hangs over most everything relating to the typhoid bacillus weighs heavily. More evidence and closer work is needed before positive statements are justified. Reasoning from analogy, and the presence of the bacillus in the kidneys, their occurrence in the urine seems most probable.

The only other method of utilizing the bacillus for diagnostic purposes is that of tapping the spleen. This has been done on several occasions and the method is spoken of as a success. Probably none of us, however, would be willing to have our own spleens tapped for the sake of a diagnosis.

So far only the distribution of the bacillus in the body has been considered. There yet remain the relations of the plant to the cell changes and the result of animal inoculation. As to the latter the weight of evidence is that the plant is not pathogenic in any of our experiment animals, certainly is not capable of producing any disease similar to typhoid fever. The inoculation of large amounts kills a certain proportion of the smaller experiment animals, but this is evidently the result of various poisonous principles introduced, and not due to the multiplication of the bacillus in the body.

In man there are certain focal or localized cell changes, over and above the diffuse changes which are more or less characteristic of the disease. Thus we have certain small round-cell accumulations in the parenchyma of the various organs,—the so-called typhoid lymphomas, and also certain other patches characterized by the loss of the staining qualities of the cells, their partial atrophy and the splitting up of the nuclei into two or more strongly staining bodies. The final result is an almost homogeneous mass, in which close study may reveal the ghosts of the cells, through

which are interspersed a number of deeply stained, highly refractive small bodies, the remains of the nuclei and some connective tissue cells. These two processes, though presenting similar optical appearances, and until recently grouped together, are in reality distinct. The first is a demonstration of life, the other of death. The same or a similar process is to be recognized in various parasitic diseases. At the present time no direct or rather topographical relation has been made out between either processes and the colonies of the typhoid bacillus. The tissue directly surrounding a colony may appear precisely like the body of the organ, or it may be altered in either of the above ways.

Again, either alteration may take place without any recognizable bacilli, so that allowing the pathogenic qualities of the plant we must attribute these changes to the general state of the body, as secondary manifestations rather than primary.

Wherever the bacillus is found it is not in the cells but between them. This shows very clearly about the borders of the colonies; at times a cell can be recognized in the thick of the bacteria. What becomes of the cells which occupied the places of the colonies I do not know; they must be either pushed to one side, digested, or simply obscured. Very likely all three.

If the reported cases of the detection of the typhoid bacillus in stools and urine are correct—probably some are and some are not—we have an ocular demonstration of their mode of dispersion preparatory to reinfection. For my own part there is no doubt but that the germ escapes from the body in one of or both these ways. With this point in mind, much work has been done calculated to show how long the typhoid bacillus can exist in dejecta, the ground, and water. Most experimenters have concluded that the time was rather short, the typhoid plant being crowded out by the other germs. This sort of work, however, is not

productive of much good; our experiments will never equal those of nature. The answer to this problem is best found by a study of the numerous local epidemics of typhoid where the source is known, not in the bacteriological laboratory. Though no spore is produced, the time will be found quite long,—longer than might be expected of a plant which apparently is incapable of a prolonged independent existence.

What we want to know is how to sterilize the dejecta. The urine is easily cared for. A moderate amount of carbolic acid and time will do it. It is my custom in all cases of parasitic disease to have some antiseptic as carbolic acid always kept in the receptacle for the urine. When dissolved, corrosive sublimate is very effective, but where much albumen is present I have been afraid to rely upon it. The stools are not so easily dealt with; corrosive is not at all reliable. Carbolic acid in strong solution, so as to produce a three per cent solution when intimately mixed with the dejecta, is safe. Just pouring some carbolic on and poking the mass with a stick will not suffice. Fæces are very difficult to sterilize. Some simple sort of oven or stove in which dejecta could be dried and burned is a great desideratum. Our large cities are supposed to see that the sewer waste is not dangerous; in smaller places out-door space for such an apparatus is most always at hand.

A word as to the examination of drinking water. The epidemiologist attributed a prominent rôle in the spread of typhoid to water contaminated with dejecta long before the bacillus was found. Time has only strengthened this position. Of course, therefore, many searches have been made for the bacillus in water—and what could be more natural than to find it? Yet Koch recently said that all reported discoveries of the typhoid bacillus in water must be accepted with reserve. It may have been found, but as yet the requisites of a demonstration have not been produced.

Very much the same may be said of milk. Outbreaks of typhoid are occasionally apparently due to the consumption of milk contaminated with infected water.

In closing we have good reason to believe that Ebert's bacillus is a species and the cause of typhoid fever; that it escapes with the dejecta and after spending a variable amount of time at large is liable to gain entrance to another individual and reproduce the disease. Lastly that a large number of unjustified conclusions as to the finding of the bacillus in nature have been given to the profession under the guise of bacteriology. Some of the records may be correct, none are beyond doubt, and few are really worthy of consideration.

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ARTICLE XIX.

MODERATELY CONTRACTED PELVES.

By RAY W. GREENE, M.D.
OF WORCESTER.

READ JUNE 9, 1891.

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MODERATELY CONTRACTED PELVES.

I BRING to your attention to-day the subject of moderately contracted pelves, in the hope that many of you will think it profitable to discuss some of the phases of this vital question. Since the department of obstetrics makes up so large a share of the work of the general practitioner, this subject deserves, it seems to me, more universal attention. Springing from this subject are questions which on the one hand affect beyond calculation the most sacred interests of the family, for the life of a mother and her child is in peril; on the other hand, the physician is confronted with complex problems, which, for their solution, appeal to the resources at his command in the art and science of midwifery, and to the sanctions of conscience as well. Indeed, no greater responsibility can come to any of us than when obliged to decide upon some action which means the sacrifice of human life though yet unborn; or when our decision by inaction may entail a more terrible calamity, because possibly a needless one, the sacrifice of the mother as well. Furthermore, are we justified in violating the course of nature by procuring a premature birth, with the hope of doing little or no injury to either and saving the life of both?

In treating these questions, let no one infer that I seek to bring into controversy the religious aspect of the case, while I keep in mind the highest duty of our profession, namely, to save life, and that the life of the mother is paramount to the life of the child. The limitation which I

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have put upon my subject, moderately contracted pelves, precludes those cases which we can easily decide must terminate fatally, but for the prompt execution of some one of the major operations, like craniotomy or Cæsarian section. Nevertheless, the pelvis of moderate contraction is not without its dangers to both mother and child, and the treatment of such cases demands closer study and more deliberate judgment than those of a more pronounced type. And here it is that the appropriate treatment brings the highest rewards.

The three cases which led me to look up this subject came under my observation within a six months, and are as follows: —

Mrs. M. came under my care at the completed term of the first pregnancy. I was summoned early of the morning of February 24, 1891. She is of American birth; average height; 27 years of age; been married 18 months. Since 8 years of age, she has been more or less delicate, owing to slight injury to spine at that time, "which some years later developed caries of the lumbar vertebræ, leaving a depression in that region which disappeared under treatment of many months in a New York hospital." There followed a slight impairment of locomotion, and after a fall some three years ago from a hammock, striking on one hip and side, she has not been able to stand on her feet without help, more from fear, as she expresses it, than from any other cause. The general health has been very good of late, especially during the pregnancy. On inspection, there appeared no deformity of the spine. The pelvis was symmetrical, the hips on the same level. The thigh and leg muscles were much atrophied.

The pelvic measurements were, viz.: anterior superior iliac spines, 8¼ in.; crests, 9½ in.; exter. conj., 7¼ in.; inter. conjugate, 3⅜ in. There seemed to be a greater inclination of the pelvis than usual, and the promontory of

the sacrum was exceedingly prominent. The labor, which had begun at 1 A.M., February 24, and the membranes rupturing an hour later, progressed very slowly. The head was located at the fundus on right side, with back toward left. The fœtal heart heard very distinctly on all sides of the umbilicus. By vaginal examination at 10 A.M., found a foot presenting, the os admitting one finger, with the cervix but little taken up.

During the evening of same day, the patient was seen by Dr. L. Wheeler, at which time the os was dilated to size of silver dollar, cervix taken up. The pains were only of moderate intensity and came at long intervals. He agreed with me as to the grave prognosis for the child. We decided that there was no indication for interference with the labor. On my first visit of the second day, 7 A.M., I found the patient had rested some, with the aid of a small dose of chloral and opium. The os was more fully dilated. During the forenoon the pains did not improve much in power or frequency, so that the patient was somewhat fatigued and more nervous. After 36 hours of labor, ether was given and the body was easily extracted, but the head was firmly held at the superior strait. In this work I was ably assisted by Dr. G. O. Ward, and it was with the greatest difficulty that our combined efforts succeeded in getting the head through. Attempts were made to get the extended arms down, but only succeeded in getting one out before the head. The fœtal heart, which was strong and regular before the operation, beat faintly for one-half hour after birth; but all efforts (lasting nearly an hour) to resuscitate the child proved unavailing. The child, a male, weighed $6\frac{3}{4}$ lbs. The bones of the skull were firm; the bi-parietal diameter measured $3\frac{5}{8}$ in. The third stage of labor was normal. The patient recovered from ether well; the pulse was of fair strength, about 130. One hour later, the patient suddenly went into a collapse. The pulse

was scarcely felt at the wrists at times, during the next two hours. The usual treatment for shock was inaugurated. For two days, the mother's condition was most critical; gradually improvement set in, and convalescence, though slow, was marked by nothing of special interest.

The second case is that of Mrs. A. American, of more than average size, 27 years old; married a few years. Always had good health. In October, 1886, her first pregnancy was terminated by a difficult labor, lasting several days; delivery finally accomplished after craniotomy. In May, 1890, the patient, being about two months pregnant, placed herself under the care of Dr. Leonard Wheeler, who asked me to see the case and make pelvic measurements. Taking the measurements independently of each other, our figures very nearly coincided, so that the average were as follows: —

Anter. sup. spines, $9\frac{7}{8}$ in. Crests, 10 in. Exter. conj., $7\frac{1}{2}$ in. We were quite surprised in not being able to reach the promontory per vaginam, from the fact that the walls of this passage were marked with cicatricial tissue, which seemed to shorten the vagina, and we could in no way push the vault up quite to the extent of a finger's length. By estimation we placed the inter. conjugate diameter at $3\frac{1}{2}$ to $3\frac{3}{4}$ in. The outlet of the pelvis seemed ample. As the family were exceedingly anxious to have a living child, I agreed with Dr. Wheeler that the premature labor at the eighth month offered the best chances to secure this end.

Under most thorough antiseptic precaution, in the 36th week, Dr. Wheeler inserted a bougie into the uterus. Two days later, no pains appearing, Barnes's dilating bags were used effectively, and an easy labor of a few hours gave a living child, born in the O. L. A. position; weight, $6\frac{3}{4}$ lbs. It required but little manipulation to get the child started in life, and its later development has been most satisfactory.

It now weighs 19 lbs., being 7 months old. The convalescence of the mother was perfectly normal.

The third case. Mrs. M., American, age 31, married, average height, quite corpulent. From an obstetrical point of view, she has an eventful history. From August, 1881, to January, 1890, she was eight times pregnant, with following results: three miscarriages in the 3d or 4th months, with adherent placentæ; one breech, which died in utero near full term and retained two weeks after its death; one footling, which died in being born; three vertex presentations, two of which were delivered alive with forceps and now living; one died in birth (forceps delivery). I saw her in the maternity-ward of the Worcester City Hospital, in Dr. Wheeler's service. The pelvic measurements were taken by Dr. Wheeler, Dr. Ward and myself. While not exactly the same, the average might be as follows: at the ant. sp. spines, 11 in.; crests, $11\frac{1}{2}$ in.; exter. conj., $7\frac{3}{4}$ in.; inter. conjugate, $3\frac{5}{8}$ in. March 15, 1891, supposed to be the 36th week, at noon, the bougie was placed in the uterus and held by cotton tampons in vagina. Labor began little after midnight, and in $3\frac{1}{2}$ hours child was easily born in good condition. Girl, weighing $5\frac{9}{16}$ lbs.; length, 18 in. Mother had normal convalescence.

Cases like these well illustrate what I mean by the term moderately contracted pelves. If asked to put it in figures, I should say that pelves of the flat variety and justo-minor type, whose internal conjugate diameter measures not less than 3 in. and $3\frac{1}{2}$ in. respectively, would come under this head.

Dr. Edward Reynolds has given the best and latest statistics on this subject, which are found in the last number of Gynecological Transactions, under the title of The Frequency of Contracted Pelvis among American Women.

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While this abnormality is comparatively rare in this country, it is very difficult to state the exact frequency, from the fact that so little attention has been paid to the subject. It seems more than likely that more cases would be found if we were looking for them. How frequently it is that the diagnosis of contracted pelvis is simply a guess, from the fact that the labor was tedious.

Too often, after hours of futile effort, the weary doctor is satisfied with the diagnosis volunteered by some old-time nurse, viz.: "That patient is too close built, sure." No measurements are taken; in fact, he knows as little about pelvimetry as the latest methods of cerebral localization. It is also overlooked that many abnormal positions are due to contractions of the pelvis; the doctor is satisfied to have made out the position, and attributes to it all the evils which follow, without thinking to discover the cause (if any exist) of the malposition.

A dwarf, a humpback, or the ankylosed hip would suggest to the dullest or least experienced observer the more than possibility of an abnormal pelvis. But it is also in large and otherwise well-developed women, as in the two cases cited, that slight contractions are found. These cases also well illustrate the way in which most frequently the attention is first called to the pelvis, that is, by one or more difficult labors. Such a history being furnished, the physician would indeed be negligent should he not ascertain the exact condition by measurements, which alone give positive proofs of deformity. Such measurements, to be of value, must be most carefully taken, more than once, with a mind unprejudiced by the history of the case or the theory of any other observer. The measurements of most practical value I have mentioned in the histories of the cases cited.

The text-books very rightly devote considerable space to pelvimetry. The directions should be well studied and frequently practised to insure accuracy. In some cases, there

is abundant room for error. In taking the external conjugate, it is with difficulty that you can be sure of your posterior landmark, especially in patients at all corpulent. This measurement should never be substituted for the internal measurement, by which the true conjugate is estimated. To be sure, there are cases where the promontory of the sacrum cannot be reached, especially in the later part of pregnancy and during labor, when the presenting part interferes; but more often the cause of failure is due to the fact that too many have never been taught or never acquired the art of thorough pelvic exploration.

In addition to actual measurements, it is important for the physician to be able to estimate any deviation from the normal in the pelvic outlet, the inclination of the pelvis, the depth and inclination of the symphysis pubis.

Having secured all the facts in the patient's history, and with a definite idea of the impediments to normal labor, the physician's judgment and skill are now severely taxed in devising his course of action. Here no absolute rules can be laid down. Any procedure must be influenced by the many questions which arise, like the following: the condition of the mother and child, the presentation, the size of the child, is the patient primipara or multipara, whether seen at full term or before?

To consider the treatment in all its detail would greatly exceed the limits of this short paper; therefore, I will make my discussion of the treatment centre about the cases given.

Here, in the first place, we have a primipara at full term when first seen, membranes ruptured, os but little dilated, pains weak and at long intervals. Measurements confirm our suspicion of contracted pelvis. The internal conjugate $3\frac{1}{4}$ to $3\frac{1}{2}$ in. The presentation is a foot. Here there can be but little difference of opinion as to treatment. The child is evidently vigorous, and the condition of the mother demands no immediate interference.

Our duty, then, is to make every provision possible for the maintenance of the good condition of the mother, for the labor is likely to be a long one, and it is desirable at least that the cervix become well dilated before any untoward event compel us to assist in the delivery. Inasmuch as the mortality of this presentation in a normal pelvis is by no means inconsiderable, only a guarded prognosis for the child could be given to the family. We were conservative enough to wait several hours after the os was fully dilated (the mother and child being in good condition) in the hope of getting stronger pains.

In interfering after 36 hours of labor, we expected by effecting a speedy delivery to relieve the mother and save the child. In this we were disappointed. Had we been able to get out quickly the extended arms, I think we might have saved the child, where the internal conjugate was but a trifle less than the bi-parietal diameter of the child's head.

Take this case again; with the exception that the head presents instead of a foot, would we have been more likely to have saved the child? To be sure, in slight pelvic contractions there are cases where spontaneous delivery has taken place, the child being born alive. But in this case the contraction is more than a slight one. The all-important factor in spontaneous delivery is wanting, viz., strong pains. Besides, the greater than normal inclination of the pelvis would, it seems to me, be unfavorable to a speedy engagement at the brim, even though the pains be tolerably strong. It might be said that had the vertex presented, we would have had better pains; but that is unlikely, from the temperament of the patient, which is more nervous than muscular. And had powerful pains been present, it is more than likely that the patient's strength would have been exhausted long before the head could be moulded through the superior strait. In hoping for a natural delivery, we

are not justified in allowing the labor to be long continued, without progress, at the expense of the vital forces of the mother. Take it for granted that the child is alive, what assistance should be rendered? Shall it be forceps or version or perforation?

Just as natural labors sometimes occur in contracted pelves under favorable conditions, so likewise the forceps, while theoretically contraindicated, may be of service in supplementing the natural forces. The objections to forceps are that they tend to increase the diameter of the fœtal head, which is already too large for the pelvic conjugate, and otherwise disturbs the normal mechanism so that an unsafe amount of traction force is made necessary. The chief objection to the use of the forceps in these cases is the immense amount of harm they are capable of inflicting upon the mother. I will admit that the unskilful operator is many times the cause of these injuries, rather than the instrument. As illustrating the unsatisfactory results of high forceps, I find in Lusk Dr. Harold Williams's figures quoted. He collected 119 cases of forceps applied above the brim. Of the mothers, nearly 40%, of the children, nearly 60%, perished. Of course, these figures are, in a *measure* only, applicable to pelves of moderate contraction. "The forceps," says Lusk, "as a means of delivery before fixation of the head, should be discarded, not because it cannot be employed with success, but because its use, even in the most skilful hands, is extra-hazardous."

The forceps being ruled out, the next consideration should be version. Between these two operations, the controversy has been long and bitterly partisan. The French, in years gone by, have given no alternative for forceps, except craniotomy. But the operation brought into fashion in Great Britain by Sir James Simpson has been quite generally accepted in this country, as an elective operation in deformed pelves. The value of turning is well stated by Barnes,

in his lectures on obstetric operations, from which I quote: "The value of turning in moderate degrees of pelvic contraction rests greatly upon the truth of the following proposition: The head will come through the pelvis more easily if drawn through base first than if by crown first." Other great authorities have affirmed this proposition, while others have disputed it. Dr. Barnes says: "I venture to submit that I have made such clinical observations as are equivalent to direct experiments." He cites cases where, having failed in the use of forceps, he does version and delivers the aftercoming head *easily*.

"The proposition is proved by these two circumstances: first, the bones of the fœtal head overlap more readily at the sutures, when the base entered first; and, second, the head is rarely, or never, seized in its widest transverse diameter. It is seized by the conjugate at a point anterior to its greatest width, *i. e.* at the bitemporal rather than the biparietal diameter."

The chief objection brought against turning in a narrow pelvis is the fact that it exposes the cord to compression, such as occurs in breech presentations. Dr. Simpson and others are of the opinion that a slight projection of the promontory of the sacrum gives a marked hollow on either side, in one of which the cord is better protected than in case of normal pelvis.

Any destructive operation should rarely need be considered in a moderately contracted pelvis, providing due skill and prompt action were shown in the employment of version; having failed in this, we must then resort to perforation to the aftercoming head. But only when the child is dead, or the interests of the mother plainly contraindicate version, should craniotomy be the elective operation.

I am aware that the Cæsarian operation has been elevated of late years from the condition of a "forlorn hope" to a standard which compares favorably in statistics with any of

the operations considered. Such specialists as Grandin, of New York, and others, are so emphatic in their endorsements that they would in every case select it before craniotomy, provided the child be alive. They also show such good records from recent hospital practice that they feel warranted in electing this operation in preference to forceps or version, in cases even of moderate contraction when the chances seem against the delivery of a living child. However promising the outlook for the future of Cæsarian section, it must for many years, at least, remain the exceptional procedure with the large majority of physicians in private practice.

In the case of the two other labors which I described, we stand on vantage ground, remote from the necessity of immediate action and in the possession of instructive history. The amount of contraction, not great, is chiefly in the conjugate diameter, which measures from $3\frac{1}{2}$ to $3\frac{3}{4}$ inches.

Both the patients are multiparæ. In the one case, a child had been sacrificed in the interest of the mother, who well nigh succumbed to the long and tedious labor at full term, terminated by an exhausting operation. In the other case, a married life of ten years had been filled with fear and foreboding, as the termination of each of the eight pregnancies seemed to this unfortunate woman, at least, the very gate of death.

Many of you are doubtless reminded of cases where the woman is carried through repeated pregnancies, expecting safe delivery at term by some lucky procedure, which sooner or later fails to save her life.

We need, then, no apology for violating nature's course in recommending the induction of premature labor. Nature herself sometimes shows the way by producing spontaneous delivery before full term in contracted pelves. The successful issue of these two cases justifies the procedure. The statistics in the books are not altogether favorable, but they

are misleading. As Prof. Dorhn remarks, it is a question of values, which cannot properly be compared, because the cases involved present an endless variety of dissimilar conditions. The only fair way is to compare the results of premature labor with the results of labors at full term in the same patients. Viewed in this way, he reports 19 cases at term, with 41 children, of which 37 died; while in 25 pregnancies premature labor was induced, with 15 living children.

Milne, in the Edinburgh Med. Journal, vol. xix., furnishes the most remarkable report, viz.: six women gave birth at term to 12 children, of which 11 were dead. In the succeeding 38 pregnancies, premature labor was induced, and 35 children were born living.

This operation is undertaken with the hope of saving both the child and the mother, but at all events to make more secure the safety of the mother. The twofold condition which works favorably for the child is the fact that the fœtal head is not only smaller, but much more plastic at the 8th month than at full term, so that with less compression and less time it passes through the shortened diameter of the conjugate. The loss of the child is generally due to the fact that the immature vital powers are inadequate to the pressure caused at birth, and to the struggle for existence after birth.

By premature labor, the mother is not simply saved from the hazardous risks connected with the major operations, but from the severe sufferings incident to a long labor at full term, and also from the many lesions consequent upon such labor, which often render the patient's after life one of endless sorrow. Scarcely any one would take exceptions to this procedure in cases like the two I have described, but would hesitate to recommend it in a case of primipara of the same pelvic measurements. Prof. Dorhn makes no difference between multiparæ and primiparæ, but applies to

either the same treatment for the same degree of contraction. Thomas puts it in a more general way. He says that "wherever it is estimated, or as is far better where it is proved, that a child at full term cannot be delivered except by instrumental or manual means, premature delivery is called for"; and I may add to this conservative statement what many others believe, that the physician is recreant to his duty if he fails to advise it. The degree of contraction demanding this operation is, according to most authorities, one where the internal conjugate measures 3½ in. or less, and the best time for the operation is the 34th or 36th week. Of course, this would depend somewhat on the pelvic measurements, and also on the size of the child. Some writers recommend the 32d to 34th week.

This operation has been too often unsuccessful in the past, in part because the operator has undertaken the task with too little knowledge or appreciation of the important subjects involved; such as the correct estimate of the size of the pelvis by exact measurement, and of the size of the child by intelligent palpation rather than trusting too implicitly in the so often deceptive calculation of the period of pregnancy, the hygienic care of infants prematurely born, the choice of method on the part of the physician, and his close attention during the operation.

When due attention is given to all the details, better results will follow, and this operation will be placed on a scientific basis, in keeping with the recent progress made in the department of obstetrics.

For sake of brevity, I have omitted very much of importance, but trust enough has been said to emphasize by way of suggestion, at least, three things:—

1. The importance of the subject demands a more general study of pelvimetry.

2. Early resort to version is a safer operation for the mother than forceps, when the head fails to engage at the

superior strait, and in many cases may save the life of the child otherwise condemned to craniotomy.

3. In premature labor, scientifically managed, we have an operation by which an immense amount of suffering may be avoided, and oftentimes a living child secured.

DISCUSSION.

Dr. Edward Reynolds, of Boston: — I think the essential points in the diagnosis and treatment of moderate pelvic contraction are the differential diagnosis, and, if I may say so, the differential treatment between the different forms of pelvis. I have failed to find any cases of flat pelvis in American women, and I think our experience with flat pelvis is likely to be confined to the imported European peasants, who form a certain proportion of our city population. Among American women, we have to deal almost without exception with the justo-minor pelvis. The diagnosis between the two is of great importance, but is one which in the majority of cases may be easily made, and the treatment which should be adopted is radically and essentially different in the two classes of cases.

The justo-minor pelvis is the pelvis of non-development, that is, of arrested development and a persistence of the infantile type. The flat pelvis is etiologically the result of mal-nutrition, starvation, exposure, and hard work at the period of puberty. It is practically non-existent among American women, and is rare even among women born in foreign countries, but nurtured here.

The flat pelvis has but slightly contracted external transverse measurements. It yields to the internal hand, on palpation of the pelvic walls, the sensation of a comparatively ample transverse space, and of highly curved lateral walls; and the head being engaged at the brim, the hand finds that there is a space on each side between the forehead and occiput and the corresponding lateral walls of the pelvis. The head enters transverse, and slightly extended. The pelvis as a whole is shallow, the sacrum highly curved, the promontory easily reached.

On the other hand, the justo-minor is a long cylindrical pelvis. The internal hand finds the lateral walls straight. The head when engaged presses with more or less equal force on all sides of the pelvis; it enters in an oblique position and extremely flexed. The sacrum is long and straight, the pelvis as a whole long; the lateral walls are not highly curved; the symphysis is long and erect.

In flat pelves, I think version is by far the more powerful and safer operation; while, upon the other hand, I think a justo-minor pelvis is an absolute contraindication against the extraction of the aftercoming head, if this can possibly be avoided, and that the use of forceps is here much the preferable operation, the chief reasons being that the extraction of the aftercoming head not only is less successful in justo-minor pelvis, on account of its being resisted on all sides by the pelvic walls, and on account of the necessity of maintaining extreme flexion in the mechanism, but because the narrowed transverse space renders it unlikely that the arms can be extracted with sufficient rapidity to save the life of the child.

The first case reported struck me as probably one of justo-minor pelvis, although I think the essential points in the diagnosis cannot be taken from the external measurements.

When confronted by a breech presentation in a justo-minor pelvis, I should use every effort to perform an external or a bi-polar version early in labor, in order to secure a well flexed head and apply forceps, in preference to being obliged to perform the usually extremely difficult, and I think generally hopeless, task of attempting to extract a living child from a justo-minor pelvis. Of course I do not mean to criticize the management of the first case, because I do not know that it was justo-minor.

I think the general principle that is most valuable for men not especially trained in pelvimetry is to assume that any American-born woman, whose pelvis is contracted, has a justo-minor pelvis, and that it is better if a head presents to use forceps instead of version. If, however, the physician knows himself to be dealing with a flat pelvis, with fair or ample transverse space, I think he better by all means consider version the operation of choice, and make the application of forceps, if he chooses to resort to it first,

merely a tentative matter, to be abandoned unless promptly successful, and succeeded by version.

It seems to me that the question of Cæsarian section rarely comes up in pelves of this class, because under modern aseptic methods the induction of labor is so uniformly successful for the mother, is attended by so little risk beyond that of normal labor, and is also so generally successful for the child.

I was very much pleased to hear Dr. Green emphasize the point of not inducing labor in accordance with a fixed rule based upon the length of the conjugate. There can be no invariable rule, for children at term vary from 5½ to 6, up to 12 or even 13 pounds. The best plan is to measure the size of the pelvis accurately, in order to find out what the period for induction should be for an average child, and then by palpation find out whether you have an average, or over-sized, or small, child, and so modify the rule in accordance with what you find in that individual case.

Dr. Leonard Wheeler, of Worcester:—I don't think I ever heard any clearer or more helpful exposition of practice in contracted pelves than Dr. Reynolds has just given. It is a matter that in the past has been neglected. I never had any education in pelvimetry. I think we skipped those chapters altogether in the school where I was educated most twenty years ago; and even in studying in Vienna, there was no attention given to it in our courses. I never measured a pelvis until I began to practise; and it is something that cannot be acquired immediately. It requires the measuring of a good many before one has satisfaction in his own measurements, and not only the external measurements and the conjugate, but the orienting of one's self inside of the pelvis to get an idea of the general state of things there. To make the picture from the sense of touch requires long experience, and it is only by clinical observation that we can formulate any rules such as Dr. Reynolds has laid down. They are very simple and I hope they are right. But those rules cannot serve for our entire guidance. We cannot divide patients into Americans and not Americans. Some are half Americans and part something else, and we have all sorts of pelves between, and his rules do not help us out in the management of women of foreign birth, for there we have the various kinds.

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I should like to ask Dr. Green how much of measuring is done in the post-graduate education here in Boston; that is, whether from the out-patient work from the hospital they do any measuring of pelves. It seems to me that it ought to be just as much a part of the obstetrical education as anything, except antiseptics; for a woman will get along well enough with most labors if she is let alone altogether, and if she is to be handled at all antiseptics are the first things; and I don't know why measuring of the pelvis is not a matter of importance, and in order to make education of any value in it, a good deal of measuring must be done.

There was an interesting point in connection with one of the cases of which Dr. Green has spoken. The woman had had eight pregnancies, with four births of children at term, two of them breech; and three forceps deliveries of the head, two of which I delivered with Tarnier forceps, the head just engaging, and in the first one there was, I suppose, a fracture of the skull of the child where it passed over the promontory. It came by with a snap, and there was a depression in the child's head that is there until the present time.

In a case with such a previous history, it seems to me that there need be very little hesitation about the induction of premature labor. It can be done with almost absolute safety for the mother, and with the care that modern appliances make possible, the prospects for the child are exceedingly good. But with a primipara, I don't see how we are to get along with the treatment unless we adopt the rule of measuring every pelvis previous to labor, where we have any knowledge of the patient previous to being called to the confinement.

Dr. C. M. Green, of Boston:—In reply to the question asked by Dr. Wheeler, as to the instruction that is given at the present time, I think the reader of the paper is a good instance of what the teaching has been within recent years on that subject; and at the present time I think much more is done with the students than when he was there; not perhaps so much at the school building as in the clinical work of the school. Of course, in the lectures the usual didactic teaching is given, where pelvimetry is described in lectures, etc.; but the best teaching of this, which in truth does not come

to every student, is in the ordinary care of cases. We do have quite a large proportion of deformed pelves, from the fact that our clinical work now is rapidly approaching one thousand cases a year outside of the hospital, and many of the patients are of foreign birth. In those cases, we have a very careful arrangement by which the student on discovering that anything is wrong, has behind him one of two or three men, who will come and discover what the difficulty is, and help him out of it. In the management of those cases, pelvimetry is carried on with a great deal of care. The pelvis is measured, the apparent size of the child is determined, and the proper operation chosen according to the nature of the pelvis. Subsequently, when that student comes to report his case, the hospital officer who saw the case with him dictates to the student the operation that was done, so that in that particular case the student has an admirable training, so far as one case will go; so that taking a class, not all students will get any practical training, but a certain proportion will. We hope to see the time when all the students, as the clinic grows larger and each student has a larger number of cases, will be pretty sure to have at least one case of abnormal pelvis; and we hope the time will come when all such cases which enter the hospital will be utilized more fully for teaching purposes. It is not easy in this country to make use of hospital material for teaching. There is an opposition which is gradually melting away on the part of boards of trustees to the use of in-patient material for teaching. The time will come when we shall be able to do much more for students than can be done at the present time.

I should like to add just a word, although little remains to be said, on the general subject. It has gratified me a great deal that one of our own men has gone out from here and continued his interest in this subject. In consultation practice, one is too likely to see that men have no particular interest in obstetrics, and pursue it because they must. If the baby comes, well and good. If it does not, they put on forceps and pull, and perhaps they get it and perhaps they don't. I do not mean to put any slur on the profession, but that is the way it is a great many times. Scientific obstetrics is not so widespread as we wish. I tell the students that they want to go out from the school better

equipped for obstetrics than the ordinary midwife. The mother needs very little help from them in normal cases; but there is a growing proportion of abnormal cases, arising from pelvic deformity, coming in some small degree, perhaps, in our American women from non-development, but chiefly in foreign women, who from starvation, overwork, rachitis, etc., have deformed pelves. This intelligent obstetrics can only be pursued by the careful measuring of pelves. Among American women, it has never been my custom to measure a pelvis before labor has begun. I think that most American women would be quite alarmed at the suggestion. I have never yet done so, except in certain isolated cases where there was good reason to believe there was some pelvic deformity, the woman never, however, having borne a child, but there being good reason from the appearance to suspect a deformity. The first baby, of course, is an experiment, always.

In the American women, we do not get the great contractions of the pelvis, as Dr. Reynolds has pointed out, and my experience has been the same, that we do not find the simple flat, or rachitic, but do get the justo-minor pelvis, which exists from non-development. I have had a number of such cases among American women, where it seemed simply as if their pelves had not grown big enough, where the degree of contraction is not great, but great enough to make it impossible to bear a child without artificial assistance. Those pelves would come within the pale of this paper. Having had one experience with the adopted line of treatment, then one can make inferences and deductions, and proceed perhaps more scientifically the second time. In other words, the treatment one would adopt at any particular time, of course, would depend largely on previous experiences in childbed, if they have had those experiences. With the primipara, the pelvis has got to be measured at the time and the appropriate treatment selected.

The difficulties of pelvimetry are sometimes so great that no satisfactory measurement can be made, as I think the reader pointed out in one of his cases, at the time of labor, so that one has to do the best he can for that pregnancy; then the pelvis is carefully measured afterwards, and in the event of subsequent pregnancies, a premature labor may be induced, or the patient allowed to go to full term, and then

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have version, or forceps, or Cæsarian section, according to the kind and degree of deformity, after due consideration.

I would like to add one word on the question which the reader alluded to, namely, the choice between high forceps operation and internal podalic version. I had the feeling that Dr. Reynolds expressed, that very likely in the first case, if the patient had happened to have a head presentation, she might possibly have given birth to a living child. It did strike me also as a justo-minor pelvis.

There is this one great dividing line that Dr. Reynolds has pointed out: that we divide pelves into the flat and the generally contracted. I have no question in my own mind, from experience and trial, that high forceps give better results in the justo-minor pelvis than version, and for the reasons which he has given. The mechanism shows that. The simple observation of a labor in a justo-minor pelvis of not sufficient degree of contraction to prevent labor going on unaided, I think shows us that—the extreme flexion of the head, showing that the head will come best in that condition of extreme flexion. The application of forceps in such cases I believe gives far better results than that of internal version, and if I were to deal with such a case, the breech presenting, I should turn the child about by external or bi-polar version, and convert it into a head case and deliver by high forceps. I have had such cases in ladies of good parentage. They were found to have just not quite sufficient developmental size to allow the passage of a large child. In such cases, I have in each instance succeeded in delivering a living child by high forceps, and I believe, therefore, that it is important to make that distinction in labor, as to what the nature of the deformity is.

In the simple flat pelvis or simple flat rachitic pelvis, where the contraction is chiefly if not entirely in the antero-posterior diameter, unquestionably in most hands the operation of internal podalic version would give better results than forceps. There is ample room in the transverse, and in such cases it is not the bi-parietal that comes through the conjugate; but the head passes through probably by the bi-temporal diameter, where there is ample room in the transverse. I have a feeling, however, that the time will come, as men become more and more expert in the use of forceps, that the forceps operation will very likely be more

commonly practised than version, even in the flat pelvis. I am led to think so by the result of some experiments, namely, that compression of the head in the antero-posterior diameter does not enlarge the opposite diameter of the head. Suppose, for instance, in the simple flat pelvis the head is seeking to come in the transverse diameter of the pelvis. Suppose the forceps is applied, one blade over the occiput and one over the sinciput. It used to be thought and taught until within two years at the school that that was a very improper operation, because it bulged the head in the opposite direction, and that the transverse diameter of the head which would be passing through the conjugate of the superior strait would be bulged larger, and, therefore, the difficulty would be increased. Careful experiments, however, have shown conclusively that such is not the case, that compression of the head in the antero-posterior diameter does not bulge the transverse diameters at all, or next to nothing. Where, then, does the brain go to? It has been shown that that is taken care of by elongation of the head; so that if forceps is put on the occiput and sinciput, instead of bulging transversely, the head elongates vertically. Now if that is correct, and apparently it is correct, I am constrained to believe that the time will come when with greater skill we shall successfully deliver the forecoming head in simple flat pelves with simple forceps on the antero-posterior diameter, with one blade to the occiput and one on the forehead.

It is, however, safe to be remembered that the high forceps operation is, on the whole, more dangerous to the mother than version, except in very skilful hands; so that I feel that one ought not to hastily resort to high forceps, unless he has carefully thought the case out, and considers himself at least moderately skilful in the use of the instrument.

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ARTICLE XX.

THE DIAGNOSIS AND TREATMENT OF INFLAMMATIONS OF THE APPENDIX.

A DISCUSSION.

BY

Drs.—

J. C. Warren, of Boston.
D. W. Cheever, of Boston.
R. H. Fitz, of Boston.
John Homans, of Boston.
C. B. Porter, of Boston.
A. Worcester, of Waltham.
J. W. Elliot, of Boston.
F. C. Shattuck, of Boston.
S. H. Weeks, of Portland, Me.
S. C. Gordon, of Portland, Me.
H. O. Marcy, of Boston.
J. C. Irish, of Lowell.
G. W. Gay, of Boston.
W. F. Whitney, of Boston.

JUNE 9, 1891.

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THE DIAGNOSIS AND TREATMENT OF INFLAMMATIONS OF THE APPENDIX.

THE Chairman, DR. J. C. WARREN, of Boston :—When asked to preside over this Section, it occurred to me that I could not select a better topic for discussion than the diagnosis and treatment of inflammation of the appendix. The subject has received an unusual amount of attention during the last few years, but has not as yet been discussed by this Society, and it seemed to me that its great importance, as a frequent and dangerous disease, made it desirable that the members of the Society should have an opportunity of coming to an understanding among themselves as to the proper mode of dealing with it. By way of introduction, I will cite two cases, which serve admirably well to show the difficulty of determining the moment when surgical interference should take place, and the treacherous nature of the disease.

I was called to the first case a few days ago. A boy ten years of age had entered the hospital after an illness of about a week, characterized at the outset by a sudden attack of pain in the right iliac region, associated with nausea and vomiting, which had continued with more or less regularity until his entrance, at which time there was some tympanites, "with tenderness everywhere, but most marked in the right iliac region, where there was an area of dulness, indefinite and small." (Record of Dr. W. L. Richardson.) Pain was constant, and he required morphia. At no time was there any great rise of temperature, and the boy's general condition seemed excellent after entrance. A great increase of pain, with rise of pulse and temperature, and a development of great abdominal distention, occurred on the fourth day after entrance. On examining him, I could find no dulness in the region of the appendix, or tumor in the

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rectum, which was well defined. An incision near the anterior superior spine of the ilium exposed the peritoneum, on opening which I found a large collection of foul pus, several ounces of which escaped. The pus cavity extended some distance between the coils of intestine; the appendix was found with its sloughing tip, and was excised. Dr. John Homans will tell you more about the subsequent history of the case. At last accounts the boy was doing well. This case illustrates one of the dangers of the disease, the supervention of a general peritonitis from breaking of the abscess into the peritoneal cavity.

The other case was reported by Dr. A. L. Mason, of Boston, and illustrates the absence of severe constitutional disturbance, in a case that terminated fatally.

E. J. B., a printer, aged thirty-four, entered the City Hospital in the medical department, January 13, 1891. He said that he had had previous attacks of colic, which were relieved by cathartics, and his trade led us to make a careful examination for lead, which was negative in result. January 11th, he ate two cakes of Baker's chocolate, to which he attributed his present illness.

January 12th. Dull pain in left iliac fossa, and at night all over abdomen, with chills, nausea and vomiting.

January 13th. Entered the hospital, stating that he had taken an enema before admission, but had passed no wind for two days. The pain was dull over whole abdomen, which was moderately tense. No tumor. Urine high color, acid, 1027; large trace of albumen, excess of uric acid; much granular débris, and a few hyaline and granular casts.

January 14th. Three loose movements in the night. Pain was relieved by morphia. Much more comfortable. Abdomen still tense, but much less tender. Palpation negative. Rectal examination not painful, and no tumor could be felt. Occasional hiccough.

January 15th. Tenderness seemed to be more localized on the left, but no hardness could be felt, and nothing by the rectum to indicate abscess.

January 16th. Fifth day. Temperature became normal; pulse 88. He was able to assume any position in bed, and had slight general tenderness in lower abdomen, not localized. No induration was found. The bowels moved three times. No vomiting since entrance. Hic-

cough occurred at times. The same conditions continued on the sixth and seventh days, and on the eighth day two small loose evacuations were noted. Normal temperature and little pain. In the evening a sudden increase of pain occurred, with collapse, cold extremities and profuse sweating, panting for breath. The abdomen became distended. Perforation was inferred; and the patient died in four hours, from shock.

At the autopsy, forty-three hours after death, the appendix was found in the interior of the pelvis, on the right side, firmly adherent to the surrounding tissues and covered by coils of the intestine. It was gangrenous, and had several perforations. No foreign body was found. The surfaces of the intestine showed recent inflammation, and in places were adherent by a thin layer of fibrin. The peritoneal cavity contained some purulent material. The left kidney and ureter were absent. Right kidney enlarged; capsule not adherent; congested. Other organs normal.

In looking backward upon this case, the following questions suggest themselves:

(1) When the patient entered the hospital, was he suffering from the effects of perforation which tended toward recovery, the fatal result being caused by the shock of a second perforation?

(2) Would examination under ether have cleared up the diagnosis?

(3) In the absence of many of the subjective symptoms, would most surgeons have deemed it advisable to operate?

(4) With a gangrenous appendix in his pelvis and old intestinal adhesions, would an operation have been successfully accomplished?

(5) How much significance should be attached to hiccough in abdominal cases?

(6) Do not cases of so-called ischio-rectal abscess result sometimes from appendicitis in the pelvis, and is not the usual course of such inflammations to find an outlet below?

Such an event is reported[1] by Dr. Vickery, in a somewhat similar case, but with more severe symptoms, in which an exploratory operation failed, and pus was evacuated two weeks later by rectum. In the same number of the Journal an autopsy performed by Dr. John Homans, 2nd, dis-

[1] Boston Medical and Surgical Journal, January 12, 1888.

covered a condition much resembling that found in the case reported above, namely, "appendix sloughed and ruptured, fixed by old firm adhesions to the lateral wall of the pelvis, below the brim, and out of reach of any possible relief by operation, if such had been attempted."

Dr. D. W. Cheever, of Boston:—It is a part of my early experience, that the frequency of appendicitis with subsequent fatal peritonitis, was first pointed out and insisted on, from twenty to thirty years ago, by the late Dr. J. B. S. Jackson. No operative interference was then thought of, and I can recall five cases, all fatal, from twenty-five to fifteen years ago, whose symptoms of perforation of the appendix and diffused peritonitis were plain and well-marked. Treatment then halted between first, leeching and mercury; second, opium.

Since operative measures were begun, I will recall, briefly, fourteen cases of my own:

(1) A boy of eighteen, in Hingham. Repeated attacks of inflammation in the right iliac region. No operation. Final recovery.

(2) A boy of nineteen, in the hospital. Repeated attacks. No operation. Slight tumor. Incomplete recovery.

(3) A woman of twenty-five, in the hospital. First attack. No marked tumor. No operation. Apparent recovery.

(4) A man of forty. Marked tumor in the right iliac region. No operation. Tumor shrinking, but traces remaining.

(5) A man of twenty-eight. Marked tumor. Symptoms of obstruction. No operation. Subsidence of tumor, and recovery under the use of calomel and salines.

(6) A boy of fifteen. Acute symptoms. No tumor. Tenderness in right iliac region. Operation. Pus evacuated. Improvement. Death from venous hæmorrhage on the seventeenth day.

(7) A child of eight. Symptoms of over a week. Tumor in right iliac region. Operation. Encysted abscess. Recovery.

(8) A man of twenty-five. Acute symptoms. Operation, right iliac region, the fourth day. Pus. Adhesions. Protrusion of the large intestine in the wound. Recovery.

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(9) Pain, tumor in left iliac region. Operation there. Abscess walled off. An orangewood tooth-pick found in the abscess. Recovery.

(10) Man of thirty-five. Symptoms left iliac region. Operation there. Localized abscess. Recovery.

(11) Prolonged symptoms of obstruction. Tumor in rectum. Tapped per rectum. No result. Finally abscess burst in rectum. Slow recovery.

(12) A woman of thirty. Acute general peritonitis. Operation. Death.

(13) A man of sixty. Latent symptoms of peritonitis. Old pericarditis. No tumor. No operation. Death. Slough of cæcum and general diffused peritonitis.

(14) A boy of twelve. General peritonitis, probably tubercular. Operation. Slow recovery.

Among six cases not operated upon there was one death; mortality, seventeen per cent. Of eight cases operated on, there were two deaths; mortality, twenty-five per cent. Of acute diffused peritonitis, not operated upon, all died; mortality one hundred per cent. The case of tubercular peritonitis operated on recovered.

Without relying much on this small number of cases, I venture to offer certain conclusions I have arrived at, in my own mind, in a general review of my experience, which covers both the non-operative and the operative periods.

The stages of the disease to be considered are: first, inflammation; second, perforation; third, walling in by lymph; or fourth, diffusion.

(1) The first twenty-four hours of medical treatment are those essential to preventing perforation, if inflammation has begun; or to promote the formation of adhesions, if perforation has taken place. This treatment is recumbency; strict diet; moist heat, incessantly applied; opium.

(2) If the vital resistance of the patient is good, we have prompt adhesions and a wall of lymph.

(3) If no encysting takes place promptly, we have a fatal diffusion.

(4) The presence of a recent tumor is a strong corroborative sign of appendicitis, but not a certain one. The absence of a tumor is an assurance of great danger, if the symptoms are acute.

(5) It is impossible to drain the peritoneal cavity.

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Dr. R. H. Fitz, of Boston:—For practical purposes, diagnosis of an appendicitis is based upon the recognition of the signs of a peritonitis, originating in the right iliac fossa. There may be other causes for such a circumscribed peritonitis, as intestinal obstruction from intussusception or strangulation. Again, the peritonitis may be of ovarian, tubal, uterine, vesical, even of rectal origin. The pain of an acute appendicitis may be suggested by a renal or biliary colic, while fæcal impaction in the cæcum or a movable kidney may simulate the tumor. Despite these possibilities, an erroneous diagnosis is not often made.

During the past five years I have seen, chiefly in consultation, upwards of one hundred cases of appendicitis. It has been my usual experience to find the attending physician has made a correct diagnosis and has rightly appreciated the significance of the symptoms. At the same time, during this period I have made an erroneous diagnosis of appendicitis in three cases, and have failed to recognize its existence in a fourth case. As this experience has already been published, mere reference to it, at present, is sufficient. Even in these cases the treatment was appropriate, although the immediate cause of the peritonitic symptoms was not correctly diagnosticated. They are called to your attention, not because similar cases are likely to be encountered, but because, in a considerable experience, such errors in diagnosis have been made.

What seems to me of even greater importance than accuracy of diagnosis, so easy in general, is the question when medical treatment shall cease and surgical treatment begin. Were perforation actually present, there would be no question in my mind; but I know of no diagnostic means by which one may absolutely determine at the outset, whether perforation is present or absent. In doubtful cases we should wait and treat the patient medically, until we get more direct indication for surgical treatment than may be present when he is first seen.

It is well to bear in mind that, of the cases just referred to, one-half received surgical treatment. Of the half which were treated medically, there was one-eighth which ought not to have been treated thus, since an abscess existed and was discharged, as a rule, into the intestine. But the abscess may discharge into the bladder, which is a very un-

fortunate complication. It seems to me that to permit the abscess to break into either of these cavities, if it can be avoided, is unwise.

But in most cases we must have more evidence to guide us in treatment than is to be had during the first twenty-four hours, or even later. We ought not to advise an operation at this time on the ground that a perforation may be present, since in one-half the cases, at least, the patient may recover if no operation is performed. He ought to have this chance, and we should, therefore, wait until the development of the symptoms is such as to indicate that there is either a spreading peritonitis, or such a circumscribing of the peritonitis as to make it probable that the operation will be successful. In waiting for these symptoms, we are to watch the pulse, the temperature, the degree of pain and tenderness, their extension outwards from the region of the appendix, and the development of the tumor, which may take place in the pelvis, the region of the kidney, or the left side. If after three or four days the tumor has developed—and by this time it does develop, if it is to form—its recognition is easy. If there is then no tumor, the indications for operation offered by the constitutional disturbances are very direct.

In my opinion, then, it is desirable to wait for three or four days, at least, after the onset of the symptoms, in order to watch the progress of the case, for the purpose of deciding whether it will recover under medical treatment, or whether it will demand surgical treatment. This waiting is not only suggested by the experience in acute cases, but it is confirmed by those cases of chronic appendicitis in which the patient has localized disturbances for months and months. Every now and then there will be an acute exacerbation, often keeping him in bed for a few days. These, however, are the cases which, to my mind, are much better operated upon, if they are to be treated surgically, in the interval between the attacks, than at the onset of an acute attack.

Dr. John Homans, of Boston:—The treatment of inflammation of the appendix has been actively discussed for about five years. The diagnosis has been pretty well settled, and any physician up to the ordinary standard of

to-day ought to be able to make it. I will not waste time talking about this part of the subject we are considering.

Notwithstanding all this discussion until the subject has become almost trite and hackneyed, the practical recognition of cases that would be fatal if left to themselves and of those that would recover without surgical aid, is as difficult as ever. In my own practice, when I operate I am sure that I am right; but when I do not, I am not sure that operation ought not to have been done. The condition of the abdomen, both internally and in its walls, after laparotomy for appendicitis, is not always satisfactory, and some of the recoveries might almost as well have died. I have had under my care, for the last four months, a man successfully operated upon, nine months ago, who has chronic discharge from two sinuses, the seat of former drainage-tubes. Another case of long but perhaps perfect convalescence, lasting more than four months, and in which the appendix was removed, has a hernia.

The possibility of the supervention of chronic suppuration, or of hernia, ought not to prevent us from operating on a case of appendicitis; but how are we to distinguish those cases requiring operation from those that will recover without it? I confess that, in a doubtful case, I am guided largely by rational symptoms.

Again, those cases have done the best, in my experience, where a well-defined abscess has formed at the end of ten days or even of several weeks. So, I prefer, if I can, to wait until such an abscess has formed, if possible. But how are we to know it is going to form, and that the patient will not die of septicæmia or general peritonitis, before we have the appendix shut off in an abscess? I operated once within thirty-six hours of the first symptoms, on a strong, healthy boy of twelve. I found the abdominal cavity to contain opaque serum, floating freely and not encysted; I did not find the appendix; but at the autopsy, five days later, Dr. Fitz found it gangrenous in the rectal fossa by the side of the rectum, and covered by the gangrenous bowel. There was general peritonitis and much pus. I believe this case was necessarily fatal from the start, and so are some others; but my early operation was of no use.

Lately I saw a case on the fifth day: a boy, nine years old, a patient in Dr. W. L. Richardson's ward in the

Massachusetts General Hospital. I judged it best to delay operation a few days, and I think the result justified my action. Three days later the abscess was opened by Dr. Warren for me, in my absence, and the boy is doing well. The appendix, imperforated but swollen, was removed.

I have under my care at present a case not requiring operation, I think. A lady has been comfortably ill for two weeks. There is a distinct tumor in the right iliac fossa. The tenderness is gradually subsiding. Now, if she gets able to be about and attend to her duties without inconvenience or pain, in short is well, she will be better off than if she goes about a year waiting for an abscess to close—and these abdominal abscesses seldom do close—or a ligature to come away, or a hernia to be cured, or with pains from adhesions. I have stated all these drawbacks, not because I wish to discourage laparotomy for appendicitis, for I am a firm believer in it, and if any one will look over my contributions to the Boston Medical and Surgical Journal, he will find many cases of appendicitis operated on by me; but I want to learn to distinguish between those cases which demand and those which negative operation.

Now, if successive attacks of appendicitis cause life to be of little value from apprehension or interruption, I would recommend an operation for removal of the appendix. Such a case I have lately treated; and I found the appendix wrapped up in a piece of thickened and gangrenous omentum, from which, and from the bowel, it was separated by a patient dissection, and was removed, close to its base. A piece of omentum, more or less gangrenous, as thick as my finger, and about two inches square, was also removed. This man recovered. Perhaps he would have done better if he had been operated upon in his first attack, but I am satisfied with the result. Gangrenous appendicitis demands operation. How are we to distinguish it from catarrhal inflammation? I think we must be guided in a great measure by the rational symptoms. If a day or two after the first onset vomiting ceases, the countenance becomes bright, the temperature falls below 100°, and the pulse to about 80, and the abdomen is soft and not tense, I think we may expect a favorable issue, with a convalescence tardy often, and tedious, but still pretty sure. On the other hand, a tense abdomen, great mental anxiety, a rising tem-

perature and pulse, with inability to take food, and increased tenderness in the iliac region, especially with a protrusion into the rectum, urge immediate operative interference, and removal of the appendix also, if it is easily found.

The varieties of appendicitis may be clinically called four:

(1) One in which the appendix is perforated, and perhaps the cæcum also, and general peritonitis is at once set up. This class of cases is generally fatal, with or without operation.

(2) Another variety has perforation of the appendix, with limited peritonitis, soon shut off in an abscess of varying size, but generally rather large and forming a well-defined tumor, often quite prominent. This class demands operation and drainage, and is generally cured.

(3) A third variety has the appendix swollen and œdematous, but unperforated; and yet the symptoms are severe, and there is great anxiety and often distention. The tumor here is ill defined and small, but there is considerable tenderness, with high temperature, pulse and abdominal distention. With no improvement in three or four days, laparotomy, and removal of the appendix, if easily found, is proper.

(4) The fourth variety has a sharp pain at first, soon subsiding. Perhaps one attack of vomiting, a tenderness on pressure, and a swelling in the right iliac region, and without any tumor in the rectum. These cases resume an almost normal temperature and pulse in a few days, and though the convalescence often lasts from four to five weeks, yet health is finally restored. The liability to subsequent attacks, however, is problematical, but operation in the initial attack is improper.

The diagnosis of appendicitis is one easily made. The treatment by operation consists in making an incision about three inches long, over the most prominent part of the swelling. When this is not well defined, the centre of the incision should be at a point two inches from the anterior spine of the ilium, in a line drawn toward the other iliac spine. If there is difficulty in finding the appendix, you will be guided to it by the longitudinal bands on the cæcum, all of which lead invariably to the base of the appendix, as was pointed out to me about two years ago by Dr. Whit-

ney, the Curator of the Warren Museum. In this operation the appendix should be removed if it is easily found, and its base should be tied and its mucous surface turned in by a suture. Except in the œdematous catarrhal cases, without much, if any, suppuration, drainage with one or two tubes of rubber or glass, should be practised, and the cavity should be well irrigated. The edge of the wound, the suture-holes, and the interior of the abscess slough more or less in severe purulent cases, and although without drainage, the necrosed tissue and pus generally break through externally rather than internally, yet I think drainage is safer.

The convalescence in all cases, whether operated on or not, is apt to be long, and I do not think it any quicker in those cases where the appendix is removed than in those where it is not found. As I said some three years ago, I think the treatment of appendicitis is the most important practical question in surgery at the present time.

Dr. C. B. Porter, of Boston:—It seems to me that the subject of appendicitis, or the cases of that disease rather, can be divided in a general way into three different classes. The first and most important is what has been called the fulminating type of appendicitis, in which all the symptoms are in great excess over the other two forms, and in which, without early interference, death is sure to follow. The second is the acute variety, in which the symptoms enter in with nausea, vomiting, pain referred to different places, generally to the umbilicus in the first place, and then to the right iliac fossa, and then to some other portion of the abdomen, this being easily explained by those who recognize the great variety of the positions of the appendix in the different cases. Then the third class, which is subacute, and in which the symptoms are not so well marked, and in which they progress much more slowly, and in the majority of cases recover.

Your chairman invited me to speak to-day more especially upon the third class, as I have defined the three; and those are the cases which give the recurrent attacks, or, in other words, the constant and repeated occurrence of pain, nausea, vomiting and invaliding, often, in bed. The whole subject has interested me, as other active surgeons, for a

number of years; but some three years ago this subject especially was brought to my mind from the fact that Dr. Hodgdon, of Arlington, brought me the case of a young man who had an attack nearly every month, which put him in bed, and he was in such a condition that he really was unwilling to absent himself from home for a night, for fear he would have an attack and be away from his home surroundings and from his physician. Going over the case very carefully, and having already looked up the literature of the subject before that, and seeing what had been recommended by Treeves and others, Dr. Treeves being the first man who recommended the excision, I proposed that he talk the matter over at home and decide whether he would submit to an operation. They selected the operation. It was done in the remission between the attacks. That was the first case which I operated upon, and it was more than two years ago. The appendix was found enlarged, stiff, standing up stiff in the wound, and adherent to the omentum. It was tied off about one-fourth an inch from the intestine; the mesentery was tied and removed. On account of the very great thickness of the walls of the appendix, it was impossible for me to invaginate it, so I covered it with a flap of omentum. The lumen of the stump I cauterized with the actual cautery. The wound was sewed up without drain. The young man made a perfect recovery, and has never had a return.

I had at that time another case, in which there had been a number of attacks. In the last attack which came to my attention, it went on to the formation of a tumor, which could be diagnosticated by the rectum as well as over the iliac fossa, and there was a point in the rectum which seemed as though it was soft and fluctuating; there was a crater, such as you find in a softening abscess. It was thought best to operate in the ordinary way. This I did with the assistance of Dr. Elliot, who lifted the tumor from the rectum, and was enabled to puncture and evacuate the pus. He made a very good recovery in the ordinary way, as that class of cases do.

When I was about to show the first case to the Medical Improvement Society, I was going to find out what had become of this second case. On the very morning of the day when I made my report, this man appeared in the acci-

dent-room with another attack. I said to him, on seeing him in the ward, "How many attacks have you had in the last year?" He said "I have had so many attacks that I have not kept account of them." It was one of the milder attacks. When he recovered, I proposed to him the removal of the appendix. It was done; and he made an uninterrupted recovery in the same way as the other.

Since these cases were reported I have operated a third time. The last case I showed to the gentlemen who were at the hospital this morning. The man, who is now twenty-six years of age, had been having attacks at long intervals since he was thirteen years of age. For four months previous to this operation he had been confined to bed by the lameness, and had lost flesh and was without appetite. He was transferred to the surgical wards, and I operated upon him. In connection with the case, I want to mention a fact which I think is well recognized by operators, and that is the very great difficulty which sometimes arises in finding the appendix. Dr. Homans has made the observation that the appendix may be found by following down the longitudinal bands upon the large intestine. That is the first rule, and the only rule I know of. Dr. Fitz, Dr. Warren and Dr. Shattuck were present at the operation that I speak of, and I could not find, nor could any one else of those present find, anything which would lead to the appendix in this case, and I had the cæcum in my hand. It was almost decided that a little knob on the cæcum must be taken as an abnormal appendix, and we had not found the cause of the trouble. I said, "We have looked everywhere where it should be, let us look where it ought not to be." By lifting the cæcum further up towards the crest of the ilium, lifting that up till it was turned up from its bed, there lay the appendix, nearly as large as my finger. It was so long that one of the gentlemen present made the observation that the kidney came down and touched the appendix. That was dug out and ligated in the ordinary way and treated as the other. A number have spoken about the difficulty in finding the appendix.

In connection with this, I want to go back to the case that Dr. Homans reported, where he removed the appendix in an acute attack, after a number of subacute attacks. I am especially interested in this case, because in the last at-

tack before Dr. Homans operated I had him in my care. I decided that he should be operated upon, and the young man consented. In my endeavor to furnish my class with cases, I assigned this case to one of the students, and he unfortunately expressed to this young man the possible danger, although I had already told him the dangers; and the young man the next morning had decided that he would not have it done. When he came back with an attack so acute that he was operated upon, I felt that he might die because of the attack, and I felt that if the young man died probably his death was at my door, and I followed him with more interest than any other case that I had at the hospital during my service while he was under Dr. Homans's care.

Now I am to confine myself to the subject of recurrent appendicitis. This last winter I read a paper before the Medical Improvement Society, and at that time I was enabled to find fifteen cases, including my own. I knew, however, that there were a number of other cases that had not been reported, in the hands of the different surgeons here in Boston; and one of my class, in writing on the subject, had found twenty cases. We have not got any very large number from which to generalize with regard to which are the suitable cases, but it seems to me that any man or woman or child who is invalided for any considerable length of time, who is unable to follow the ordinary avocations of life from constantly recurring attacks of appendicitis, after being told what the dangers are, should be offered the relief of an operation; that those people who are obliged to travel, who are obliged to go away from the place where they can get good surgical aid, should be operated upon in the remission between the attacks; and it is especially to these two classes of cases that the operation should be limited.

With regard to the dangers, every one of the fifteen cases that I found recovered. Now I know by hearsay, but have not seen it in publication, that there are cases that have died from this operation. That must go without saying, that a laparotomy cannot end in complete recovery in every instance, no matter how carefully done or by whom. Against this operation it has been urged that ventral hernia sometimes follows, and that a man's last estate is worse than his first. It is well recognized that all surgeons open

the abdomen at times as a mere means of diagnosis, and in cases where the disease is not threatening to life, and where there is not so good an opportunity to relieve as in these cases, so that in my judgment the question of ventral hernia could not be considered; and not only that, but a man who thoroughly appreciates the best methods of closing the wounds will close his peritoneal surfaces first, then his muscular tissues second, and the skin last; and in that way he has made a wound which is as near proof against ventral hernia as human skill can make it, it seems to me.

Secondly, if a person must come for operation, how much better if he might come in the remission between the attacks, when you have not a purulent wound to deal with, but you can do everything with the greatest antiseptic precautions, and carry out every detail of asepsis, closing the wound throughout. You don't have to leave a drainage-tube in, which certainly, to my mind, could be nothing more than forming a diverticulum through which a hernia might find its way.

Now it seems to me that these are important points in connection with the operation in the remission between the attacks, and I feel sure that the surgical mind is growing toward the line of operating. If you are in doubt whether to operate or not I believe that the proper thing is to operate, and that it is a good deal better to give the patient the benefit of the doubt than to take it yourself.

Dr. Alfred Worcester, of Waltham:—I believe the only advantage which I have over the other gentlemen present is that I have been through it myself. I have been very much gratified by what I have heard, and I certainly notice a great difference each year as to the treatment recommended by our first surgeons, and I am as certain in my own mind that we will have to wait but a few years before the right treatment will be laid down and applied, and that is to operate first, last and every time in the cases of appendicitis. When that was first broached, the necessity of operating in every case, it was laughed at by very nearly everybody, and now it is laid down for us that we should certainly operate in those cases which are going badly, perhaps, not in those that are going to recover, any way; but, it is at the same time told us, that there is no

possible way by which we can tell what cases are going to the bad. Now, whatever the percentage of cases treated medically, it certainly is not a large one; there certainly is a large per cent. that will not recover unless receiving surgical treatment; and of the class of cases that will recover only if surgical treatment is given, a very large proportion will recover only if that treatment is given early.

All the dangers of the operation, all the difficulties, all the dangers resulting afterward, do not apply if the operation is done at the outset of the disease. It is a very difficult thing indeed, every one admits, to save a case by operation where there is an indistinct abscess cavity and perhaps a general purulent peritonitis. You have heard it laid down this afternoon that, in general acute peritonitis there is no such thing as recovery. I am sure that I have seen such a case recover, where the abdomen was thoroughly washed out, where the appendix was in the pelvis, was found, was taken out, and the stump was properly treated. But in cases operated on at the outset, before the appendix is perforated, whether gangrenous or not, there is no such thing as disaster.

It is a simple operation, it is easy to find the appendix, there are no adhesions in the way, it is easily removed, the stump can be properly treated, and while I say that, I want to say that I do not believe it proper treatment to ligate it. It seems to me that that is unsurgical; it is not like ligating the Fallopian tube, it is like ligating a part of the bowel, and when the part separates, what is to hinder an escape of fæces? Of course, there may be resulting inflammation that will close it, but the proper way, it seems to me, is the treatment applicable to any other opening into the bowel, bringing the surfaces together. It is not easy to pull in the edges, but if the core of it is dug out by a V-shaped incision, the edges can be turned in easily. But this proper treatment of the stump can only be done when the operation is done early; it is not possible when you find the appendix ready to drop off as you touch it—it is not easy then to repair it properly. It seems to me that the reason why so many cases have proven fatal is, that the result has been lost sight of, that the bowel is really perforated. And what sense is there in leaving out of consideration the question of the integrity of the bowel? If the

operation is done in the last stages of the disease, after three or four days, the sloughing appendix is fished out, and we depend on a rubber tube, let down into the abscess, near the stump; that is not any more sufficient than if we depended upon a drainage in the abdominal cavity by a tube running down somewhere near a perforation in the bowel. It is recognized, it seems to me, in every other variety of bowel wound, that it is necessary absolutely to close any perforations of the bowel before the abdominal walls are closed up. It seems to me that it is just as necessary here.

In my judgment the main difference arises from the fact that appendicitis is claimed to be within the physician's province until a certain time, and that it is for him to decide when to call in the surgeon, and the surgeon comes and is relieved of the responsibility of the case; he is called either too early or too late. If you get him out too soon it is "too soon." If the patient dies it is "too late." Gentlemen, appendicitis must be treated by the surgeon from the first to the last; it is just as much a surgical disease, and entirely within his province, as any disease that can be thought of. There is no use in leaving the physician to decide when to call the surgeon in, for he will not call him in until he finds that he cannot save the patient himself. Sometimes the end of the first day is later than the end of the first week in other cases. It will not do to shift the responsibility upon the man who will be called the next day.

I want to point out one great advantage in the early operation. It is easier to diagnosticate the disease in the first twenty-four hours than at any subsequent time. All the symptoms are more apparent at first. After the belly is swollen out no man can diagnosticate the case, except by abdominal section; but, at first, when the abdomen is flat, when you can, by deep pressure, get all over the abdominal cavity, it is generally easy to decide whether it is a case of appendicitis or some simulating attack. The ease of operating, that is the thing that I want to impress. I would rather have appendicitis under the care of a country surgeon who was willing to operate the moment he recognized the disease, than to be under any of the surgeons who would not operate, although they recognized the disease early, because it is impossible to tell what cases are going to the bad. In the very worst cases of appendicitis, the patient in that

condition will have a good pulse and temperature. Beginning collapse is not very easy to recognize. I have seen cases where you could hardly persuade the patient himself that he was very sick, where death was already stamped upon his face. So I say I would rather have the care of an experienced surgeon than to run my chances under a man who felt that by waiting he could tell the best time for operating. What does that mean? It is an easy operation, I am willing to admit, when the inflammation resulting from the perforating appendix is well walled off. But just think what slippery bricks that wall is made of. It is nothing more than coils of intestines. A cathartic will break that down. A little increased peristalsis will break the wall, and the pus is diffused. In some cases, of course, it is an easy operation to evacuate the pus, but after the pus is out fæces generally follow. That means that the integrity of the bowels is lost; it means that there will be recurrence, that there will be sloughing of the edges of the wound. If it is taken early it is just as clean an operation as if done between the attacks. There is great difficulty in the intervals between the attacks. There are adhesions everywhere. The appendix has sometimes not been found, and even if it is found it is quite a serious operation, for the adhesions have to be broken down; but in the very first attack there are no adhesions in the way, you can easily find the organ, you can treat the stump, you can close the wound without putting in a drainage-tube, and you can have the man at work in a few weeks' time, as I have had the pleasure of seeing.

We are asked how it is we have so many cases in Waltham. Perhaps it is that we do not have to sign our death certificates as peritonitis. We report our cases. Now, if any of us have operated so far in a case where there was no appendicitis, or where any injury resulted from the operation, then I admit we stand properly impeached. We have reported our cases, except our last dozen, for the last year, and they will be reported very soon. And when that is a record of cases operated on in the first twenty-four hours, and when we found that in some of them the appendix was gangrenous from the outset, and when we report that our patients are at work after a very short and sure convalescence, I think we have the right to hope that the time is

not too far distant when what I said at the beginning will be held true, that the treatment of appendicitis belongs to the surgeon from the first; and in the great majority of cases the patient's chances will be better if he is operated on as soon as the diagnosis is made, and that being so, the duty rests upon every one of us to operate just as soon as the diagnosis is made.

Dr. J. W. Elliot, of Boston: If any of you have any doubt that perforating appendicitis is like a bullet-wound in the intestines, you may be interested to see these appendices which I have excised within the last year: (Drawings shown.) That appendix was sloughing out at the end of the fourth day. That had an opening in it very much like a bullet-wound; on the third day that patient had a purulent peritonitis. Here is another case, operated on the third day, with a sloughing, gangrenous appendix, which was wrapped up in the omentum, illustrating that phase of the disease. Here I pass around a case of chronic appendicitis. I will not report any of these cases, as they have all been reported previously.

Dr. Worcester certainly made a very strong plea for early operations, and I very nearly agree with him, but not quite. We are all afraid of appendicitis when it begins. We do not know what will happen. We know that the cases are very dreadful. I think it is your instinct to operate immediately on every case, to avoid any disaster; but I am sure that the facts will not sustain that position. The third part of Dr. Fitz's cases recovered without operation. That is a very large number to be thrown out of consideration.

Last year I was called in consultation in private practice in thirteen cases. Six of them were operated on; seven were not operated on; and all the seven recovered perfectly. All of those cases had serious symptoms. If a patient has a purulent gonorrhœal endometritis, there is great danger of salpingitis, perforation and death; but surely, that is not a reason for operating and removing the tubes. This is not intended to be a fair parallel, but it illustrates a point which I want to bring out later. What we want to do is to find out when we shall operate, and when we shall not, and what we shall do when we operate. I except all chronic cases, all old cases that are walled off;

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these will not come into consideration with me to-day. The question is, When shall we operate? As I said, one-third of the cases, according to Dr. Fitz, recover without operation. I have seen very severe forms of appendicitis, and am very much afraid of it; but there are certain mild cases which I see, which I feel confident from the start are not going to require operation, and usually do not. But if you make that general statement, some one who does not know what the symptoms are which should cause alarm will surely go wrong. Constitutional symptoms should not be relied on. It is the cases with temperature under 100° and pulse under 100 which die for want of the operation. Now, I do not pretend to solve this problem, but there is one thing which I think helps me a great deal, and I think may help other people; and that is, it seems to me, the difference between the old and the new surgery. In a very general way this difference is that the old surgery depends upon the general symptoms, the new upon what you find locally. It is skill in examining which has made great advance in the treatment of salpingitis, and operating as soon as we know that the dangerous local condition is present, before constitutional symptoms appear, that has made the difference.

Thus I hold that all symptoms which indicate that a local process has begun in the region of the appendix are to be very seriously considered, and almost always are a sufficient reason for operation. I should always operate in the presence of a tumor; I should always operate in the presence of general distention and tympanites; I should always operate in the presence of continued pain. Of course, when the constitutional symptoms are violent, they are often in combination with local symptoms. And violent constitutional symptoms should certainly be acted on. Yet constitutional symptoms, in my experience, are not so valuable as local symptoms.

I have had a case within a year where there was elevation of temperature, with only moderate local pain, with no distention. There was no question about the diagnosis. The temperature gradually fell to normal, there were never any symptons of thickening, and the patient made a good recovery. On the other hand, I have had a patient with pulse and temperature practically normal on the third day, the abdomen rigid, expression that of a very sick person,

where on operation a purulent peritonitis was found. Now Dr. Worcester wishes to lay it down as a general rule that it is better always to operate, but from the scientific point of view, that thirty per cent. must be taken into consideration, and what we want to do is to work out the symptoms, to get at the exact value of all the symptoms; and I am perfectly sure, that I can do a great deal more now, after experience in reading the symptoms, than I could three or four years ago. I should say then, not to operate on every case as soon as the diagnosis is made, but operate on every case as soon as any symptoms appear which are really threatening, and that from the point of view of one who has weighed carefully the value of symptoms.

Dr. F. C. Shattuck, of Boston:—I must enter my protest against the view that every case of appendicitis is to be operated on as soon as seen. Of fifteen cases entering my wards at the Massachusetts General Hospital within the past few years, in all of which the diagnosis was clear, and most of which were seen also by one or another of my surgical colleagues, eleven recovered without operation; four were operated upon, and, alike, all recovered. Probably a larger proportion of cases than has been mentioned at this meeting does perfectly well without operation. The experience of consultants, whether medical or surgical, is apt to be misleading, in that they are called mainly to the very severe cases only of this or other affections.

At present, at least, we must make some mistakes in the doubtful class of cases of appendicitis; and some sort of balance must be struck between those cases in which a successful operation might be, but is not done, and those in which the knife is used unnecessarily. Even in these latter days the surgeons of the largest experience are those who seem to feel most keenly that a laparotomy is not an absolutely innocuous precedure. In illustration of the difficulties in reaching a decision in some cases the following are cited:

A gentlemen is seen within a few hours of the onset of acute and alarming symptoms, and sent to a private room at the Massachusetts General Hospital. Dr. Cabot sees him daily in consultation; he has general symptoms and a well marked induration in the iliac fossa. On the ninth

day it is remarked that were he in the open ward he would have been operated on before, but it is decided to wait one day longer when it was confidently expected that an operation would be done. The next day the patient seemed rather better and then made a perfect recovery, with complete absorption of the tumor, and uninterrupted good health for the past two years.

A boy of 13 is seen in consultation on the fifth day, pulse 130 odd, temperature 100.5,° persistent vomiting. An eminent surgeon is called in immediately, and it is decided to wait till the next morning, 18 hours. It seemed doubtful whether he would come out of the ether if operated upon. The next morning he was distinctly better, and soon was apparently convalescent. On the eleventh day there was a return of fever, vomiting, and rapid pulse. The twelfth day he was seen again and promptly operated upon, although it was not thought that his chances were greatly improved thereby. A large abscess was opened and death followed two hours later. This case should have been operated on earlier. But it received careful consideration and the result probably would have been the same.

A woman enters the medical ward of the hospital on the fourth day. Dr. Warren sees her in consultation, and later, Dr. Fitz. On the tenth day she is transferred to the surgical side for operation, seems to improve, is transferred back in a day or two, but is again sent to the surgical side on the fifteenth day and operated upon. A very large abscess is opened, and a small lump, apparently of fæces, escapes; a counter opening is made in the flank; final recovery ensues. This case, again, should have been operated on earlier.

Such cases are not unusual, but come into the experience of us all. They show that our knowledge is defective; they do not seem, to the speaker at least, to show that the knife should follow immediately on the diagnosis of appendicitis.

Dr. S. H. Weeks, of Portland, Me.:—I consider myself very fortunate in hearing this discussion on this subject, in which I have had so much interest, by men of eminence and large experience. I must confess that it is apparent to me now that even here the full sunlight does not shine upon this important subject; we are not prepared to say that this method or that method is the best. I am satisfied that the

early operation is not the best operation. Inasmuch as it is true, as you have heard here to-day, that a large number of patients with appendicitis recover without surgical operation, and inasmuch as we cannot at first decide what cases are to recover, we must wait until we are satisfied that this particular case demands the surgeon's knife. Furthermore, I believe that in the cases that require operation later on there is an advantage in waiting. There is an immense advantage in having a peritonitis which is circumscribed when the surgeon operates; and my first endeavor is to limit the inflammation, circumscribe the suppuration, and if I can secure that, if I can secure circumscribed peritonitis and circumscribed abscess, then, if I come to operation, my patient will very surely get well.

Now there are two different plans in the early stages. I believe in the saline cathartics in the very beginning. I know from my own experience that thorough action of the saline cathartics, unloading the canal, relieving the bowels of the accumulation of gas and fæcal matter, does bring a tendency to circumscribe the inflammation, to limit the suppuration; and I also believe in the early application of leeches and then fomentations. It seems to me that this plan of treatment in the main is the best plan, and a plan which is applicable to all cases,—those cases that ultimately get well without an operation, and those cases that require the surgeon's knife later on. In the course of three or four days we are able to say what cases will get well, because those cases that get well without an operation at the end of three or four days begin to show signs of convalescence, and recovery gradually goes on. If at the end of that time the symptoms are no better, if there is a remission, then that is the time for the surgeon to step in.

One word with reference to the remark made by Dr. Worcester as to the opening in the appendix being the same as an opening in the intestines; it is not true. I am sure it is not true. What is the function of the appendix? It is simply a lubricator. It has no secretion. It is not a part of the intestinal canal as to its function. Fæcal matter does not circulate through the appendix, and when a foreign body is found there, it is not a grape seed or something which has found its way there; it is a concretion which has formed there, just as a biliary calculus is formed.

Now, with reference to the ligation of the appendix at the time of the operation, I pay but very little attention to it when I operate. I simply open the pus cavity, wash it out, and leave the appendix untouched, unless it happens to lie in the cavity where I can reach it. In no case has there been a fæcal fistula. This is the point: I think the opening into the appendix is very different from the opening into the intestine.

Dr. S. C. Gordon, of Portland, Me.:—For the last two years I have had some convictions about the matter under discussion. That is a good deal to have in a matter of this kind. My convictions have amounted to substantially this: that we have been paying altogether too much attention to the appendix, that we are called to a condition, and that condition is one of peritonitis. Now for practical purposes I do not care what the cause of that peritonitis is, I am going to treat that peritonitis exactly as if I do not know what the cause was. My treatment has been purely the saline cathartics from the start. Suppose you remove that cause, you have not removed the condition. I think there is the mistake of the surgeon. "Only let us get at the cause." Medicine has been saying for thousands of years, "Remove the cause, and you have cured the disease." It is not true, it is all false; and surgery has done an immense deal of harm on this idea. An appendix producing appendicitis is no worse than a great many other things producing peritonitis. I do not care whether an appendix is the cause of the peritonitis. It is peritonitis that I am called for, and that I am going to treat by the modern approved method of treating peritonitis. The only wonder is that we did not do it fifty years ago. We did fifty years ago; but thirty years ago we began to be wiser, and Alonzo Clark ruled the medical and surgical world. It is only such a man as Tait who had the courage to come out and say cathartics are the thing to treat peritonitis with. Therefore, I believe that if we will stick to the idea that we are called to treat a condition, we are going to save nine-tenths of the cases of appendicitis without operating.

No amount of medical or surgical treatment will save all patients. But if you are going to get a localized abscess, you are going to get an abscess with the walls of very much

more integrity if you treat it by saline cathartics, if you unload the vessels; for you then have an abscess wall which has some vitality to it. If you have allowed that patient to go along without relieving the condition, if you have everything in the intestinal canal, your vessels are crowded and the tissues they supply die; but if you have unloaded the vessels and relieved all this congested and inflamed condition that you can, you are going to preserve the integrity of the exudate. When you have your abscess well defined, you need not hesitate; take your time to satisfy yourself that you have a localized abscess; take your time, and open it; take out your appendix, if you can; if you cannot, let it alone; drain the abscess; and I believe you are going to cure the cases that can be cured by operative surgery. This is my belief, this is my plan, this is my conviction. I think we have paid altogether too much attention to this appendix. It does no more harm than anything else. Therefore, I think it is the medical man who is going to treat peritonitis successfully, for he is going to use modern methods.

Dr. H. O. Marcy, of Boston:—I had little idea, sir, of saying anything. I think, in common with most of you, we have been very much interested in this subject in the last three or four years. One of the first subjects that I ever studied in medicine was the letter published under the title of "Another Letter to a Young Physician," written by Dr. Jackson. There we find clearly and carefully laid down many of the very factors which we are now discussing. I am reminded, however, by my friend, Dr. Gordon, of the discussions which occurred about fifty years ago in London, between Sir Benjamin Brodie and our famous Dr. Watson. Sir Benjamin asked Dr. Watson if he would have the kindness to give his opinion, and he said: "It is good surgery, sir, that we might remove the causes, and thus their effects may be taken care of."

I am also reminded of a discussion in Washington, a few days ago, when, after the surgeons had said a good many things, one of the company arose and said he wanted to tell his experience. He had a case of appendicitis recently, and he was in doubt, so he asked in a fellow-surgeon. He thought it wise to operate at once and within an hour the buggies of the three surgeons were at the door. Then a

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brother came upon the scene and refused to allow the operation until it should be determined that his sister was going to be sick. On the second day she was out.

I am delighted to find that my friends, Dr. Weeks and Dr. Gordon, take practical medical views, and yet it seems that we may discuss it a little more at length, for it really, after all, is not the ordinary condition that we call peritonitis. We have a local septicæmia, a local septic condition, which is going on first in that little organ, and it is owing to the result as to whether it shall remain or whether it shall become constitutional, that your patient recovers or dies.

I am sure, as I look over my history of twenty years or more of surgical watchfulness, I have seen such patients go to their deaths and the autopsy show that that patient ought to have recovered. My friend Dr. Worcester has pointed out that this is the fact. Within the last five years I have operated eight times and seven have recovered, and I cannot help thinking, had I not operated, that the result would have been far different. Formerly we saw these patients going to their death, and thought that we were doing all we ought to. Now let us see what takes place under modern surgery. We are able to tell you that at least nineteen cases out of twenty will recover if you take them in the condition where you can remove the appendix. If that is true, it is wiser practice, because the danger is less. Otherwise you are waiting for nature to do what she sometimes utterly fails to do, namely, to circumscribe the abscess. Our fathers knew how that should be cared for. Unfortunately there comes the time when the circumscription of the inflammation ceases, and where the first case I operated on showed clearly that I had waited forty-eight hours too long.

It is in just this class of cases, and in this only, that we want special light, and it is here our knowledge utterly fails, for we cannot tell when our inflammation is going to leave and where our danger lies. I should say, if I wanted to give my opinion in a word: If there is any doubt, give the patient the benefit of it, and operate. I have watched cases carefully and not operated; but there come cases where it is clearly your duty not to wait any longer, but to give the patient the benefit of modern surgery, and then we

shall save a much larger percentage of our cases than we can do by saline cathartics or by waiting to see if nature herself is competent to do it.

Dr. J. C. Irish, of Lowell:—I do not feel that I can add very much to this discussion. In all these appendices that have been presented here we can see that more or less tissue is necrotic. I do not see how it is possible for nature to care for these cases.

Dr. G. W. Gay, of Boston:—The brief remarks which I have to offer upon this subject are the results of experience. I do not wish to be dogmatic in my remarks, for there is yet much to be learned in this and allied affections. Experience tends to show that the majority of cases of non-traumatic peritonitis in the male are due to inflammation of the appendix. In the female, salpingitis, pelvic cellulitis, and kindred affections are to be considered in the ætiology. Many cases of so-called "obstruction of the bowels," with peritonitis, have their origin in the appendix, and when seen late, should be treated as appendicitis, even if there be no localization of the symptoms. General peritonitis often begins as a local affection. The characteristic early symptoms may have been obscure, overlooked, or very likely have become masked by others before coming under the attention of a physician.

Localization of symptoms at any stage of the disease is of great importance as an indication of the character of the disease. The earlier these patients are seen, and the more closely they are watched, the more certain will be the diagnosis and the more intelligent will be the treatment. Pain in the belly, increased by coughing; tenderness, greater in the right lower quarter; and rigid abdominal muscles, more marked upon the right side, are among the most constant early symptoms of appendicitis. If the affection is located deep in the true pelvis, the rectal examination rather than the vaginal will probably reveal its existence. Chills, fever, constipation of gas as well as of fæces, and prostration, all go to confirm the diagnosis of appendicitis or other serious lesions in the vicinity.

The symptoms of a true convalescence are easily recognized; but in many instances it is by no means easy to form

a correct opinion of the patient's real condition, before that stage is reached.

Mild cases will often recover in a few weeks under the "expectant" treatment; that is, rest in bed, opiates, leeches, poultices or fomentations, and a judicious diet. Occasionally a case is met with in which the symptoms are threatening at first, but soon reach their climax, say in two or three days, and rapidly disappear, leaving the patient with only an occasional twinge to remind him of his trouble.

Operative measures are indicated under the following circumstances: Severe cases should be operated on in from two to five days, according to the urgency of the symptoms. If they are seen to grow worse every six to twelve hours, radical measures should be resorted to on the second or third day. Collapse generally means perforation of the appendix, and calls for immediate operation unless the patient's condition forbids it. Cases in which the symptoms are not very severe, but are steadily growing worse, had better be cut in about eight or ten days. Cases in which the symptoms are mild and stationary, not progressing in either direction, call for an operation in from two to four weeks. A recurrent attack not infrequently requires operation; and the more severe the previous illness, the earlier should radical measures be resorted to.

Chronic inflammation (catarrhal) of the appendix may not suppurate. Nevertheless, the symptoms may be very distressing and persistent, forcing the patient to lead the life of an invalid. The peculiar feature of these cases is that relapses are of frequent occurrence as a result of overexertion or slight exposure. An operation for the removal of the appendix, similar to Tait's for the removal of an inflamed Fallopian tube and ovary, promises the most certain and permanent relief under these circumstances.

Cases of severe general peritonitis which have never been localized, as a rule, are unfavorable for operation. It is difficult, if not impossible, to thoroughly wash and drain the peritoneal cavity by reason of the numerous adhesions which form in a few hours. Under these circumstances, an operation probably has little, if any, effect upon the course and result of the affection. The surgeon, however, is not infrequently led to operate upon these cases from being called late to the patient, and from having insufficient knowledge

of the earlier symptoms of the case to enable him to be reasonably sure of the character, and from the fact that the patients do recover under alarming conditions. And furthermore no other treatment offers any encouragement.

There is comparatively little danger in operating too early in the bad cases. There is far more danger in delay. Brief periods of improvement are oftentimes treacherous in these affections. In doubtful cases delay is justifiable, more especially if the patient is so situated that he can receive efficient aid at short notice. It is a question whether operators with the largest experience in the affections have not been more disappointed in the result of the expectant treatment than in the operation. Convalescence in the former is not infrequently long and tedious, and the recovery not satisfactory. Relapse and recurrence are also not infrequent under these circumstances.

The presence of a tumor or other localized symptoms is by no means essential to an operation. If the affection is located at the bottom of the iliac fossa, or deep in the pelvis alongside the rectum, no tumor need be expected to present to external manipulation until the collection of pus is very extensive.

Other things being equal, patients probably do better and make a more satisfactory recovery if the appendix, fæcal concretions, and other offending substances are removed at the time of the operation. A pretty thorough effort to this end should therefore be made in a majority of cases. Abscesses will not heal soundly while foreign bodies,—be they fæces, a gangrenous appendix, or what not,—remain inside.

Little danger need be apprehended from pus in the peritoneal cavity, provided a free outlet be furnished. Not infrequently those abscesses have to be drained through a healthy peritoneum, and those cases do as well as any. In my efforts to find and remove the appendix, I have in several instances broken through the limiting wall of the abscess, and have thus far seen only an occasional local tenderness, which has always subsided in a few days. A peritoneum that has once protected itself under these circumstances can be trusted to do it again. If it will tolerate the product of inflammation, it will surely tolerate clean fingers and instruments, which are much less irritating.

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In conclusion, I would say, the greater experience serves to strengthen my opinion, that, unless the surgeon has great grounds to suppose that the appendix is not at fault, he is justified in exploring that region by operation in every case of peritonitis which is in a dangerous state and is growing worse, and also in those cases which do not show signs of recovery in a reasonable time, under other methods of treatment.

Dr. Wm. F. Whitney, of Boston, then made some remarks on the position of the appendix, its minute structure, and its pathology, illustrating the subject by lantern-slides made from photographs taken at the Harvard Medical School.

V.15 no.3

TRANSACTIONS

ARTICLE XXI.

THE ANNUAL DISCOURSE.

COLLEGE OF PHYSICIANS & SURGEONS CHICAGO

THE MEDICAL PROFESSION AND THE COMMONWEALTH.

By FRANK WINTHROP DRAPER, M.D.
OF BOSTON.

DELIVERED JUNE 8, 1892.

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NOTE.—At an Adjourned Meeting of the Mass. Medical Society, held Oct. 3, 1860, it was

Resolved, "That the Massachusetts Medical Society hereby declares that it does not consider itself as having endorsed or censured the opinions in former published Annual Discourses, nor will it hold itself responsible for any opinions or sentiments advanced in any future similar discourses."

Resolved, "That the Committee on Publication be directed to print a statement to that effect at the commencement of each Annual Discourse which may hereafter be published."

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THE MEDICAL PROFESSION AND THE COMMONWEALTH.

Mr. President and Fellows
of the Massachusetts Medical Society:

The father of modern lexicographers defines a physician as "one who professes the art of healing." This definition, even with its evident limitations, accords with the popular idea of the doctor's proper place in the world's affairs; he is of value as a prescriber of remedies for sickness. His characteristic business is the cultivation of therapeutic skill. To this end, medical education is largely directed, with its clinical features made prominent. To the attainment of this result, hospitals lend their aid and specialties have been organized in such numbers and variety as to confound the traditions of conservatism. All this preparation and specialism fairly represent the current notion that the art of medicine, rather than medical science, is the physician's specific domain. How to defy successfully and to conquer effectively the foe of the household,—this is held to be the main purpose of our profession, our chief reason for being. "They that be whole need not a physician, but they that are sick."

But while the medical and surgical practitioner illustrates in his clinical round of duty his principal function, there are other relations in his

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experience to which his profession necessarily exposes him. Some of these are imperative and cannot be evaded; others are voluntary but are full of noble possibilities; all of them, properly used, give increased value and dignity to our professional vocation. In the discharge of the distinguished duty which places me in your presence at this time, I shall endeavor to make clear the true attitude which our profession should maintain toward some of these external conditions. I ask your indulgent attention to a study of the relations which, as physicians, we hold toward the Commonwealth.

Our obligations to the State derive added significance from the circumstances attending the incorporation of the Society of which we are the Fellows. Our organic existence began in the troublous times at the close of the revolutionary war, when the more hopeful felt sure that they saw the dawn of an independent nation, but did not dream of the difficulties and delays that were to postpone for nearly a decade the establishment of constitutional government. The seat of military operations had been carried southward, leaving New England without serious apprehension of the further presence of hostile forces. Yorktown was the point upon which, during the early autumn of 1781, attention was centred, and here the war reached its triumphant climax. Meanwhile, here in Massachusetts, civil affairs, though still unsettled, had begun to take permanent shape. For a year, the people had been living under a constitution of their own devising, an instrument of solid framework, the

prototype and model of many others constructed after it.

It was at this time, when the national government was in revolutionary instability and our own Commonwealth was in its infancy, that a few medical men, chiefly resident in Boston, saw the desirability of an association that should bring qualified practitioners into closer relations for their own benefit and for the good of the public. No doubt there was ample ground for this feeling. The exigencies of the war then closing had called many Massachusetts physicians into the public service, where they met associates from other States and, with them, by the intercourse thus available, were stimulated to discuss the needs of the profession and were led into a community and cohesion of interests not possible otherwise. Out of this opportunity and experience grew a purpose to secure order in place of medical chaos. Medical knowledge was limited and the facilities for obtaining it were difficult; more difficult in New England, indeed, than in other sections of the country. There were already many pretenders and knaves who made easy prey of the credulity of humanity. There was no standard of medical knowledge or of fitness to assume the responsibilities of medical practice. Recognizing these conditions, the public-spirited founders of our Society resolved to come into closer union for the common good.

The preliminary deliberations which led to our incorporation are not matters of record; we simply know their results. But these results are sug-

gestive of the bond of attachment which, at this time, existed between the State and the better class of medical men and which has never been in serious peril since. The very name of our association is one evidence of this. Our fathers might have looked across the sea and found an appropriate title in some "Medico-Chirurgical" society or "Academy of Medicine" or "College of Physicians," which could be translated to the new world. But this would not have been in harmony with their purpose; their purpose was to make a "body politic and corporate" which should establish "a just discrimination" between educated practitioners and ignorant pretenders in medicine, a purpose that had in view the welfare of the community in its broadest sense. They therefore asked the General Court to give permanent expression to this object by granting the name of the Commonwealth to the new guild and by bestowing corporate privileges that should correspond therewith. That request was granted and we are the *Massachusetts* Medical Society, broader than medical sectarianism, abhorring exclusiveness, loyal ever to the State's highest interests, proud of the charter which, bearing the historic names of John Hancock and Sam Adams in attestation of its validity, the State bestowed upon us in 1781, the first document of the kind granted under the constitution. The commonwealth thus became our *alma mater*. She gave her name to our newly created body; she endowed us with valuable rights; and she bestowed other encourag-

ing assistance and recognition. If she did not actually rock the infant "body corporate" in the "cradle of liberty," she contributed an added flavor of legality and dignity to our first proceedings by loaning the "county court-house in Boston" as the place of meeting for Doctor Holyoke and his thirty fellow-founders, and placed us under new obligations of gratitude later by permitting meetings of the society in the state-house and in other public buildings belonging to the State.

Such was the beneficent and disinterested aim of our fathers in founding this association; such the gracious and helpful attitude of the Commonwealth in aiding that foundation. It is becoming in us, the heirs and beneficiaries of the endowment thus established, to ask how the aim of its creators has been fulfilled during all the years of the century now drawing to its close; to what degree the prosperity of the State has been advanced by the Fellows of this organization; and what are our present duties to the public in the discharge of the trust which our organic charter imposes. The little company of physicians which assembled in the county court-room near Scollay square, in November, 1781, has by normal growth become a multitude so large that it requires an entire block of buildings to supply the needs of its anniversary meetings, outgrowing all less adequate accommodations. Keeping pace with the progress which has made Massachusetts a leader in all things that make for the highest civilization, our organization holds and has long held the highest rank as the

representative of the best type of scientific and practical medicine. It is true that it does not include, nor has it ever included, in its fellowship, all those who by education and personal character have been entitled to avail themselves of its privileges. Undoubtedly there are many practitioners who ought to be on our rolls of membership but who are content to remain as medical gentiles. Any study of the relations of physicians to the commonwealth should not omit these from its scope. It is their misfortune, as well as their fault, that they neglect the invitation to affiliate with the only incorporated association which represents in the largest sense the principles which should be dear to every educated medical man. But I remember that what I have to offer to-day, while it may apply comprehensively to all who use the title and perform the functions of physicians, is addressed especially to a body which for more than a hundred years has stood for the best that is attainable in medical science and art, and it is therefore peculiarly appropriate that the physician whose relation toward the commonwealth we are to discuss should be the physician who is also the Fellow of this society. It is likewise fitting that the commonwealth concerning which we speak in this connection should be the one to which we owe allegiance as citizens and the one from which we derive our chartered rights as Fellows.

Massachusetts, in founding its constitutional government in 1780, established three co-ordinate, yet independent, departments; and ordained that

the legislative, the executive and the judicial functions should be forever distinct. This three-fold distribution of organic powers and duties in the State invites consideration of our relations, as physicians, to each of the fundamental departments, and leads us to ask what has been accomplished and what remains to be done in directions wherein the commonwealth and the medical profession are mutually concerned.

I. To what extent, then, in the first place, has the State, through its General Court, as its legislative department, enacted laws that are of particular interest to the members of our profession as a class? An inspection of the public statutes will be rewarded with the discovery of the following requirements, exemptions and prohibitions, in force at the present time:

"Practising physicians," with a few other equally fortunate public servants, are exempt from enrolment in the militia.

"Able and discreet men, learned in the science of medicine" are to be appointed medical examiners in each county.

"A physician who has attended a person during his last illness" must furnish, for the purposes of registration, certain specified facts relating to the patient and his illness.

"Physicians" shall make a monthly report of the births at which they were present, the penalty for neglect being double that for delinquency in the matter of death certificates.

"A physician shall give" immediate written notice of all the cases of such diseases under his care as the local sanitary board declares to be dangerous to the public health, and again the penalty for neglect is substantial.

Under carefully devised provisions and restrictions, "any physician or surgeon" may have the dead bodies of certain paupers, "to be by him used within the State for the advancement of anatomical science"; and, in similar fashion, he may have the dead body of an executed murderer; but if he "willfully digs up, disinters, removes or conveys away a dead body" without authority, or "buys, sells, or keeps for sale, the dead body of a human being," he shall be punished by imprisonment or fine.

No insane person shall be committed to a lunatic hospital except upon the certificate of "two physicians" having special qualifications and complying with specific requirements; and in each of the State lunatic hospitals, "an educated female physician shall be appointed assistant physician."

When the estate of a deceased person is insolvent, "the necessary expenses of his last sickness" stand as a preferred claim before all other debts; while if the insolvent debtor be living, "all debts due to physicians for medical attendance on him or his family" are third in the order of priority.

"Practising physicians and surgeons regularly licensed" are in the list of persons exempt by law from serving as jurors; but they are not excused from any of the requirements which pertain to

witnesses in courts of law, nor have they any special privileges if misfortune overtakes them and a judgment for debt is to be executed.

Among the "twelve reputable citizens" to whom the law accords an invitation to be present at the hanging of a condemned murderer, "a physician or surgeon" is especially included.

"A physician or surgeon" is mentioned in the list of the officers to be appointed by the Governor for the administration of affairs at the state prison and the reformatory prison for men; while the reformatory prison for women has, according to the statute requirements, a staff almost wholly composed of women, including the "one physician" whose term of service is "during the pleasure of the Governor and Council."

Such are some of the statutory privileges and obligations which to-day apply to Massachusetts physicians. It cannot have escaped your notice that the obligations far exceed the privileges. When we have mentioned exemption from jury and militia duty, some preferment of the claims of physicians against insolvent estates, the rarely used permission to dissect dead bodies, together with the happily infrequent opportunity of attending a judicial hanging, we have included all the essential benefits which the commonwealth bestows on medical practitioners. It is not a long list of special indulgences, nor a very valuable one.

Another feature of these statutes invites a word of comment. Is it just and equitable, on the part of the State, to exact gratuitous service and to

punish us by a heavy fine for non-compliance? This is a question which has exercised the minds of medical men who were entirely free from any purely mercenary bias. Take the matter of death certificates, for example; the determination and proper formulation of the cause of a death is a work requiring professional skill and judgment. It is not the easy task which it appears to be; and those who have to do with the registration of deaths know the truth of this, for they see numerous instances of failure and blundering in this seemingly simple matter. I doubt not that many of my audience have met with difficulty, again and again, in the satisfactory framing of a death-certificate, and have done some severe medical thinking in order to comply with the statute requirement. And this service the State exacts as a formal matter, without any return consideration; more than this, it makes neglect or refusal to obey the law forthwith a crime of the same grade and with similar penalties as the passing of a toll-bridge without paying the legal toll, or the wilful suffering of one's sheep, swine or fowl to trespass on his neighbor's land, or public indulgence in profane cursing and swearing. And the same reasoning applies to the requirement that every physician shall give immediate notice in writing, over his own signature, of every case of small-pox, diphtheria, scarlet fever, or any other disease which his local board of health declares to be dangerous to the public health and which he is called upon to visit, the penalty for disobedience in this in-

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stance being not less than fifty not more than two hundred dollars. Let me not be misunderstood. I am not desirous for a moment of arguing that the State is wrong in requiring from physicians this service concerning the living and the dead; I regard the registration of vital statistics and of infectious diseases as fundamentally indispensable to all sanitary administration, and to take any position of apparent hostility to it or to suggest any course of conduct that would impair its value and completeness would show a deplorable lack of wisdom. Nor am I pleading for the principle of remuneration for all service rendered; for I believe that every intelligent and public-spirited physician, recognizing that his contributions to registration will aid in maintaining and promoting the public health and general welfare, would not be stimulated to better or readier obedience of the statutes if, for each certificate, he received a small fee. On the other hand, he is not inspired to do his duty more punctually through fear of fines which, like the Quaker guns of Manassas, are meant rather to intimidate than to destroy. Yet the criticism remains true, that there is an obvious want of equity in the fact that the State makes an unrequited requisition upon physicians for medical facts which they alone can supply at an expense of time and knowledge, and threatens them with punishment as petty criminals if they neglect or refuse to heed the requisition promptly. If a penalty in connection with registration is to be exacted at all, it would be more worthily attached

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to wilfully false and fraudulent certificates, to certificates that try to cover criminal abortion under the disguise of septic peritonitis, or that conceal suicidal pistol-shot wounds under the euphemism "rupture of blood-vessels and hemorrhage," or that attempt to mislead by calling a suicide by laudanum a death by coma.

This matter, indeed, is not an important one; but it is worth while to mention that the commonwealth has shown some inconsistency by recognizing that the services of physicians do have a value, trivial in degree, yet real in fact, when applied to observations and reports requiring no special skill to make them. For if a physician reports punctually to the clerk of his city or town a correct list of all children born therein during the month next preceding, at whose birth he was present, he shall receive for this purely clerical duty a fee of twenty-five cents for each birth so reported; while neglect to report such list is punishable by a fine not exceeding twenty dollars. It is notorious that the registration of births in Massachusetts is defective, even under this legislation which has provided a hope of reward and a fear of punishment as the double incentive to the faithful discharge of a public duty.

The critical student of the public statutes who searches for any evidence therein that the commonwealth through its legislature has ever set up any standard of education or skill on the part of medical men, will find little in existing laws to reward him for his inquiry. In a few instances,

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the general court has provided that special, though purely relative, qualifications shall be requisite in certain contingencies. Generally, however, the members of our profession are mentioned under their generic title simply, as "physicians" or "physicians and surgeons," and the undoubted intent is to include under this term all who publicly announce themselves to be practitioners of the art of medicine and undertake to treat sick or injured persons, either for reward or gratuitously. There is no attempt in the statutes to classify or to define "physicians," to declare by legislative act who may practise medicine and who shall not, to protect the people from the evil doings of ignorant pretenders, to establish a standard which would exclude both fools and knaves. Massachusetts has ever been hospitable to all sorts and conditions of men, and she welcomes with a reckless graciousness any who choose to pass her open door. She knows no sects, no schools, no differences among physicians; all doctors are alike to her and, according to the assembled wisdom of her law-givers, they can safely be left to take care of themselves according to the principles of the common law. There is no distinction, either natural or arbitrary, which our statutes recognize, to mark the fraudulent pretender from the educated and trustworthy practitioner. To the citizens of this State, there is absolutely unrestricted liberty in the choice of their medical attendants when they are ailing or are injured, a full realization of the very opening words of the constitution of the

commonwealth, that "the end of the institution, maintainance and administration of government is to secure the existence of the body politic, to protect it, and to furnish the individuals who compose it with the power of enjoying in safety and tranquillity their natural rights and the blessings of life."

This attitude of Massachusetts, allowing unrestricted freedom in the practise of physic, has exposed the State to much criticism. It has given rise to the impression that her present policy of non-interference with medicine has always prevailed, and that she is now simply carrying forward a traditional rule of conduct in obstinate indifference to the lessons of experience learned in other and younger communities. This inference is incorrect. Long before any of the modern devices for statutory regulation of medical practice were announced, long before many of the commonwealths which are now taunting us had been staked out in the primeval wildernesses of the west and northwest, Massachusetts saw the need of controlling the pretensions and active arrogance of charlatanry within her borders and the clear duty of bestowing her recognition upon reliable men and women. As early as 1649, the colonial legislature enacted a law concerning "Chirurgeons, Midwives, Physitians," which forbade all "persons whatsoever imployed at any times about the bodyes of men, women or children, for the preservation of life or health . . . to presume to exercise or put forth any act contrary to the known approved Rules

of Art, . . . without the advice and consent of such as are skillfull in the same Art," upon such "severe punishment as the nature of the fact may deserve"; and the act has this quaint codicil, that the law "is not intended to discourage any from all lawfull use of their skill, but rather to incourage and direct them in the right use thereof." Does any statute of the many relating to medical practice, which the present generation has witnessed in various states of the Union, show a better spirit?

But we need not look beyond the words of our own charter of incorporation to find full evidence that long ago the State discriminated sharply between those who merited confidence and those who deserved to be restrained. The whole document, from its preamble to its conclusion, is filled with the flavor of this wholesome feeling. But that which applies itself chiefly to our purpose in this regard is the remarkable sentence which, like a strong back-bone, is built solidly into the very middle of the charter:—

"*And whereas it is clearly of importance, that a just discrimination should be made between such as are duly educated and properly qualified for the duties of their profession, and those who may ignorantly and wickedly administer Medicine, whereby the health and lives of many valuable individuals may be endangered, or perhaps lost to the community*:

"*Be it therefore enacted by the authority aforesaid*, That the president and fellows of said socie-

ty, or other such of their officers or fellows as they shall appoint, shall have full power and authority to examine all candidates for the practice of physic and surgery, who shall offer themselves for examination, respecting their skill in their profession."

This placed a premium on proper qualifications and proved fitness. It established a standard and made our society the keeper of that standard, and if with the recently accepted Bill of Rights in popular remembrance, it did not forbid the practice of medicine by those who neglected or failed to become licentiates under this charter, it nevertheless gave the community, what it had not had before, a chance to have its medical practitioners classified according to their worth and learning. It was a most responsible function to place upon this young society of physicians, but the trust was adequately fulfilled then and is to-day being fulfilled; and the men and women who possess the letters testimonial of the censors of the Massachusetts Medical Society attesting their demonstrated and approved knowledge and fitness need no further passport to the full confidence of the people and no better certificate to distinguish them from those who "ignorantly and wickedly administer medicine."

But Massachusetts, through its legislature, did not stop here. It supplied in our charter a standard by which it strove to distinguish the genuine coin from the counterfeit, and it created the agency for the application of this standard to all who wished. Subsequent enactments strengthened and con-

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firmed this aim. The act of incorporation of 1781 was altered in 1803, the better to "effect the important and desirable purposes for which it was designed." The limit to the number of fellows, previously set at only seventy as its maximum, was removed; the councillors were created; and a board of censors was provided who were to examine candidates, and to give to such as were successful in their examination a certificate of approbation and of their license to become practitioners in medicine or surgery; "after three years of approved practice in medicine and surgery, and being of good moral character, and not otherwise," these licentiates were to be eligible for the higher honor of becoming Fellows. By this same act, district societies were allowed to be organized for purposes of medical improvement, and each district was endowed with the additional function of sharing with the censors-at-large the authority to examine and admit candidates for the regular practice of medicine. In 1831, the provision that required three years of probation for licentiates before they were admitted as Fellows of the Massachusetts Medical Society, was repealed.

These various enactments, designed specifically for the organization and development of this society, but having the fundamental purpose also to improve the character of the medical profession in general in this commonwealth, do not complete the catalogue of statutes which the legislature has made for the regulation of medical practice.

Broad as our charter was, in its permissive provisions, it was not in the least useful as prohibitive legislation. We might admit all duly qualified practitioners to our ranks, we had no control over the disqualified pretender who cared little for the privileges which the Massachusetts Medical Society offered. This weak negative side in the then current statutes came at length to be seen, and in 1818 a law was passed which was designed to remedy this defect. It is of interest to us that the State continued to turn to this Society to aid in the fulfilment of its purpose. The statute provided that every person practising physic or surgery in Massachusetts, without having received a medical degree from some college or university, or without being licensed by some medical society, or college of physicians, or by three Fellows of the Massachusetts Medical Society to be designated in each county by the Councillors, should not have "the benefit of law for the recovery of any debt, or fees, accruing for his professional services"; and every licensed practitioner was required to deposit a copy of his license with the clerk of the town where he resided. Just a year later, the general court modified its predecessor's work and enacted that no person entering the practice of physic or surgery after a specified date should be entitled to the benefit of law for the recovery of any debt or fee for his professional services unless, previously to rendering those services, he had been licensed by the regularly appointed censors of the

Massachusetts Medical Society or had been graduated a Doctor of Medicine in Harvard University.

This law, it will be observed, distinctly recognized the principle of the regulation of medical practice, and this was the only good purpose which it served. It had two ludicrously weak features; it did not provide any punishment for failure or neglect to procure the required license, and while it presumptively made the way of the irregular practitioner a difficult one in the matter of collecting his fees, it left him perfectly free to do what no reputable physician ever does, it left him free to take his pay in advance. Nevertheless, the law was so satisfactory and acceptable in its working, that it was re-affirmed in all its main features in the Revised Statutes of 1836, seventeen years later, this Society being still designated by name as the authority to manage the machinery of examination and licensing; but there was this important modification,—the courts were no longer closed to such unlicensed physicians as sought legal help in the collection of their fees. The penalty for neglecting to secure a license was still missing, and the only express reward for compliance with the law was the privilege of dissecting dead bodies acquired in accordance with well defined conditions and restrictions still extant. This anomalous statute (*vox et preterea nihil*) remained in force without amendment until 1859, when it dropped out of sight in the general revision of the laws made by the legislature of that year. Since its disappearance from the stutute book there has

been nothing unlawful in "ignorantly and wickedly administering medicine" to the people of Massachusetts in violation of any statute; the principles of the common law are the only safeguard.

Meanwhile, during this period of thirty years, a wave of legislative virtue has swept over the land with reference to the regulation of medical practice. One State after another has passed restrictive laws of greater of less stringency but with the single aim of discouraging quackery. How effective these laws have been in accomplishing their purpose, or how zealously they are executed, in the various communities, we are not now concerned in determining; the suggestive fact is that Massachusetts stands almost alone in her attitude of toleration. Of one result of this state of affairs we all are clearly aware. The action of neighboring States, near and more distant, in requiring irregular practitioners to move on and to stand not upon the order of their going, has brought to our too hospitable territory a horde of medical pretenders who have not been slow in discovering the advantages of an asylum here. Moreover, the unlimited freedom which characterizes medical practice has encouraged the growth of a native variety of charlatans and adventurers; the weeds are not all of exotic stock, some of them are indigenous and have been permitted to grow in rank luxuriance. It is safe to state that never in the history of the commonwealth has such a wide variety been offered to her people in the matter of choosing a medical counsellor in time of sickness,

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and that never has the class of charlatans been so numerous or so haughty.

And what a motley company they are, these disreputable parasites upon the medical profession! They offer to the curious student of anthropology a great diversity of types, ranging all the way from the long-haired male Indian medicine-man to the short-haired female christian scientist; creatures with "natural" and supernatural powers, extraordinary owners of superior intellects who find no difficulty in the problem of curing incurable diseases; bio-chemists, nature-pathists, mesmerists, vivopaths, psychopaths, botanic healers, magnetic healers,—a great procession of social pests with labels designed to captivate the unwary and the credulous.

But these people who boldly affect superiority by announcing themselves openly as irregular practitioners, and by assuming an eccentric or distinctive title in proof of it, are not the worst representatives of their class. The charlatans who are most harmful are those who deliberately and fraudulently take on the simple designation of "physician," and so far as any outward sign is concerned are not to be distinguished by the public from the best and noblest members of our profession. It is possible that this variety of irregular practitioners shows, in their method of making a living out of the public, a higher degree of shrewdness than their fellows of the former class, because in their use of professional titles, the prefix, "Doctor," and the suffix, "M.D." are in no

respect different in their external application, from those employed in a genuine way by right.

Then, there is another form of medical fraud which manifests itself in the shape of "medical institutes." These are evidently business enterprises simply, and the management being in the hands of several persons, who are always announced as distinguished, successful and trustworthy exponents of medical science, the victims of disease read the obvious lesson that in a multitude of such counsellors there must be safety.

But however we may classify and differentiate these people, they all have certain characteristics in common; there is nothing beneficent in their motives or actions; they are to the last degree mercenary; they are busy obtaining money under false pretences; they add nothing to the common stock of knowledge; they contribute nothing to the social welfare; they are a constant menace to the public health. They defile the columns of the daily press and of the religious weekly journals with disgustingly suggestive notices of their pretensions and insinuating invitations to walk into their parlors. They make open solicitations through their advertisements to the victims of lustful practices to add crime to imprudence, and they cover with the thinnest disguise their public and defiant announcements that they will commit unlawful acts and will take all risks of detection and exposure. It is openly declared that, disguised as female practitioners of medicine, they conduct houses of prostitution. They deface all

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accessible surfaces with their bold and lying promises, and offend good morals by their too open allusions to unmentionable subjects. Like juggling fiends, they take advantage of every form of human misery to raise hope where hope is vain, and they wickedly and cruelly draw the last possible dollar from their credulous victims, who get small comfort from the fact that payment has been made in advance for the wretched disappointment of unfulfilled agreements. If in such a case death comes to the relief of these double sufferers, the ignorance of the only physician recognized by the statutes in such a relationship is attested by the manner in which the required certificate of the cause of the death is executed, sometimes unintelligibly, sometimes fraudulently, covering a crime under the name of an innocent disease, and always raising a doubt and question of the value of such data for the purpose of vital statistics.

Can it be possible that Massachusetts, which has long defended its claim to the possession of superior wisdom in the care of all matters pertaining to public health and public morality, is willing to tolerate this state of affairs indefinitely? Is not her indifference reprehensible? And have not we, as physicians, remained far too quiescent under these growing evils? Have we not evaded a duty while we maintained a neutrality? Ought we not now to speak out boldly and persistently until some effective measure has been adopted to control and suppress the fungous growth of quackery? It is to legislation, supported by an enlightened

public sentiment, and rendered fruitful by an energetic enforcement, that we must look for the real remedy, legislation that shall be practical without being cumbrous or needlessly burdensome. This is not the occasion for outlining the details of such legislation; whether the statute should supply a method of registration administered by some already established board, like the State Board of Health; or should require examination and license through the agency of a purely medical board; or should be framed upon the model of the English law which forbids the false and fraudulent use of any name, title or description, implying that its user is a physician or surgeon, when he has not been educated or licensed as such,—all these matters may safely be left to legislative wisdom. But the main point is that the commonwealth should afford to its citizens some guarantee that the persons who are permitted to practise medicine are trustworthy by virtue of education. Above all, let it be understood and insisted upon that this guarantee, with its attendant conditions and penalties, is not a matter into which sectarian medicine enters in any degree. Let there be an avoidance of all differences relating to schools of practice. Let not the smoldering embers of medical contention be drawn out of the ashes and fanned into life for the gratification of controversialists. Let it be remembered that this is not a question of therapeutics or of medical ethics, but a question of medical education, with the fundamental purpose of excluding from medi-

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cal practice those who are unfit for it through ignorance or wickedness.

But, some will say, how does this matter concern the Massachusetts Medical Society, as a society? Why need this organization trouble itself to take any part in securing legislation against quackery? Are we not in the possession of an indefeasible charter, with ample protection of our rights and privileges as physicians? Do we not enjoy, as a Society, the respect and confidence of the community? Does not the public recognize in this association a body of medical men and women offering ample evidence of the trustworthiness and intelligent skill that are desired? If any educated physician in Massachusetts wishes to acquire the privileges of this recognition, by entering this fellowship, is not the way easy and the method simple? Why need we, an old and honored body of regular physicians, fret about quackery? Do not the charlatans give us new and profitable business by their blunders? Why should we meddle with the inherent right of every individual to choose his adviser in case of injury or sickness? Will not the prudent man make seasonable inquiry and select the best; and cannot we wisely leave this decision without dictation, sure that in the long run the fittest will survive? Why need we ask to have new burdens and restrictions placed upon us?

From the point of view of expediency and propriety, as they apply to this Society, this purely selfish and pharasaical course of reasoning is clearly

correct. This organization will do well to maintain its independent attitude. It has no wish for a renewal of the legislation which formerly made it the sole censor of medical practice in this State. It is content to attend to its own affairs. It has no ambition to pose as a monopolist in medicine. It sets an example in medical tone, and in its traditions and present aim, cordially favors the highest attainable development in medical education and medical practice, but it has seen the mischief and disappointment which have attended attempts made, in its name, to influence and procure medical legislation. But this view does not absolve us, its individual members, from grave responsibility regarding questions of public welfare. We are citizens of the commonwealth as well as physicians; and, as citizens, jealous of the good name of Massachusetts, ashamed of her false position in the matter now under discussion, we have the right and the duty to protest that some remedy should be applied to eradicate the evils which I have tried to describe. We ought to do all in our power to secure some practical process of sifting which shall afford to the people an assurance that the State is unwilling to trust the lives and health of her inhabitants to charlatans and adventurers. We ought to insist, and insist again, that it is not for ourselves, or to promote our own interests, that we wish the State to interfere, but that it is in behalf of the thousands in her population who, through lack of knowledge or discrimination, become the victims of chicanery and fraud. We

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ought to demand that protection for the classes of people that do not and cannot protect themselves. If professedly intelligent and cultured persons choose to demonstrate their wisdom in a peculiar fashion, by amusing themselves with the mind-cure, and christian science and hypnotism, and other genteel fads, it should be with the distinct condition that it is without the State's approval of their folly. The strong desire shown by a certain class of individuals in this community to imitate and emulate their prototypes in ancient Athens in eagerness "to hear and to tell some new thing" offers no excuse for indifference, for human life is in the balance as the material upon which the novelty is to be tried as an experiment.

In this matter, we can take a useful lesson from the very class of pretenders who are under our study. The lesson is that if we would accomplish anything with the legislature, there must be harmonious, energetic, associated action. Let there be but a whisper of an intended purpose to obtain legislation to regulate medical practice, and the swarm of charlatans, grown bold by its very numerical strength in Massachusetts, begins to organize for defence. The whole body comes to the rescue with a zeal and enthusiasm born of a resolve to ensure self-preservation. They raise funds, the manner of whose distribution it would not be respectful to intimate. They secure able counsel in the persons of eloquent lawyers or popular clergymen, who talk long and well of personal liberty and the rights of man. They publish a newspaper

of their own, which gives information of every movement of their "enemy"; and, by methods easily imagined, they convert to their views the newspapers which others publish and which derive from the advertisements of quackery a revenue not to be despised. And so it happens that the petitioners for legislation, only half prepared for effective action, usually representing a small coterie and a divided sentiment, have gone down again and again before this numerous and powerful alliance of falsehood and fraud, and have been given leave to withdraw. It is evident that this experience will be repeated until we realize the extent and the strength of the force which has intrenched itself in our midst, and until we emulate it in enthusiasm, sacrifice and persistency.

Is it not extraordinary that Massachusetts has always been so ready to legislate in an endless variety of directions affecting the life and well-being of her population, and is reluctant to interfere with uneducated and unfit practitioners of medicine? The general court has provided for the inspection of nearly everything that enters into domestic administration, and has ordained proper penalties for frauds and adulterations; we have ample protection in the matter of milk and vinegar, chocolate and nails, gas and leather, confections and drugs; but none against the charlatan. Massachusetts licenses her auctioneers and her pedlers, her pilots and her publicans, her pawnbrokers and her warehouse-men, her dentists and her druggists; she places even clergymen and

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lawyers under regulations, but no difference exists in her esteem between the educated physician and the fraudulent healer which an adjacent State has spewed out upon our soil. We have statutes for the protection of lobsters and smelts, rabbits and partridges; but for sick people, the State offers no defence against quackery.

Let not medical men say that it is useless to seek a remedy from the legislature, that charlatanism has become too firmly rooted here to be eradicated by any means, however drastic. Repeatedly it has been demonstrated that measures of reform have been successfully accomplished with the aid of our profession in shaping and guiding legislation. Take a single illustration, the evolution of the methods prescribed for the commitment and treatment of the insane. As late as 1827, an act was passed by the Massachusetts legislature which included every excited lunatic with "rogues, vagabonds, common beggars, and other idle, disorderly and lewd persons," and provided for his incarceration in a jail or house of correction until he was "restored to his right mind." This barbarity continued until the State, in 1832, heeding the representations of physicians, established the first lunatic hospital at Worcester. For many years after this, the process of commitment continued to be a purely legal one, without any required medical examination. But the protests of physicians again prevailed. In 1844, the legisture passed an act which recognized, for the first time, that insanity was a disease, whose diagnosis

required medical knowledge, rather than legal acuteness. In 1862, it was enacted that for the commitment of an insane person to a lunatic hospital, "the evidence and certificate of at least two respectable physicians" should be required as a preliminary to establish the fact of insanity. Some modifications have been made in the amount and character of the medical evidence in these cases, but the recognition of the true nature of insanity and of the propriety of placing its humane treatment in the hands of physicians, rather than in those of the keepers of jails, was due to the labors of such men as Bell, Wyman, Ray and Jarvis. This result shows the effects which medical men may accomplish at the State House if only their efforts are rightly directed and persistently exercised. Other examples of this force might be cited. The statutes relating to the public health, to the registration of vital statistics, to compulsory vaccination, to the use of subjects for anatomical study, to the investigation of deaths by violence, are all memorials of the intelligent zeal of medical men in shaping and obtaining wise legislation. What physicians have accomplished in the past is an augury and proof of what they may now accomplish in the attainment of statutory regulation of medical practice. And not in this direction alone. There are other matters wherein wholesome laws are needed. I have only to suggest the desirability of legislation for the more effectual prevention of the spread of contagious diseases, including syphilis; for less barbarous

methods in the punishment of convicted murderers; for better dwellings for the poor; for medical inspection of schools; for the compulsory establishment of a local health-board in every town. In these, and other similar directions, the educated physicians of Massachusetts have it in their power to bring about salutary reforms. It is a power that is not sufficiently appreciated by us, its possessors. It is a power which may find its correct exercise in various ways: in the open and candid expression of opinion as we meet our acquaintances and clients; or in properly formulated memorials to the general court; or in attendance and spoken testimony at hearings before legislative committees; or even in service in the law-making body itself. It is to the credit of our Society that its members have shown their willingness to interrupt their professional labors and to respond to the call of their neighbors to represent them in the legislature. It is an honorable service, and nearly every session has found, included in its rolls, the names of reputable physicians, members of this Society, who have given intelligent and faithful attention to legislative problems, the satisfactory solution of which has been largely due to their wise counsel and to the experienced judgment derived from their medical training.

II. But the true test of the value of laws lies in their faithful execution and judicious application. Let us inquire, now, concerning the relationship of our profession to the Commonwealth's executive department.

In two instances, Massachusetts has selected its supreme executive magistrate, the Governor, from the medical profession and from the fellowship of this Society. Governor John Brooks was elected in 1816 and continued in office, by annual re-election, until 1823. He was a practising physician, and became a Fellow of the Massachusetts Medical Society in 1786. He undoubtedly received high political recognition on account of his services as an officer during the revolutionary war, for he held the rank of Major at the battle of Bunker Hill, and, later, was in command of a regiment and was held in high esteem by Washington. It does not appear, however, that his medical knowledge acted to discredit his reputation, or to limit his efficiency, as a Governor; for his long service in that office is good proof of the manner in which he commended himself to the people's favor. His standing as a physician is attested by the honorary degree of Doctor of Medicine which Harvard College bestowed upon him in 1810, six years before political success lent adventitious lustre to his name as a medical man. It is further attested by the fact that he was chosen in 1808 to deliver the annual discourse before this Society, and by his election to the presidency of the Society in 1823, as soon as he was excused from farther service as Governor of the State. He was greatly attached to this organization, and gave good proof of his interest in its welfare by bequeathing to it his entire medical library.

Governor Brooks was succeeded in 1823 by

another physician, Dr. William Eustis, who died in office in 1825. He, too, like his predecessor, had a reputation derived from his military services in the war of the revolution; but his services here were distinctly in the line of his profession, for he was associated with Dr. John Warren and Dr. William Gamage in the care of the wounded after the battle of Bunker Hill, he himself being the senior surgeon of the staff. Although he had studied medicine with Dr. Joseph Warren, who is better known by his title of Major General, it does not appear that Dr. Eustis ever took a medical degree. He remained in the army surgical staff till the close of the war. He joined this Society in 1785. He evidently had ambition to shine in other orbits than that of the plodding practitioner, for besides being governor of Massachusetts he was, earlier, a member of congress, a secretary of war and a minister resident at the court of the Netherlands.

These two physicians appear to have satisfied the desire of the people for governors having medical training and experience, although tradition suggests that, since the time of Eustis, other medical men have not been reluctant to assume the cares of the office if the opportunity appeared auspicious for their ambition. But it should be stated that long before Brooks and Eustis, long before our Society was conceived, Massachusetts had in her colonial history two other governors who were primarily magistrates, but who knew enough of medicine to add materially to their usefulness

and esteem. Governor Edward Winslow "was skilled in the practice of physic" and made his therapeutic attainments materially advantageous to the colonists of Plymouth and to their aboriginal neighbors as well. Governor John Winthrop, too, added to his other claims to the gratitude of the settlers of the Massachusetts Bay Colony, a practical acquaintance with drugs and their uses, which made his public functions all the more beneficent. His double service to his people was recognized by his venerated pastor, Rev. John Cotton, who described him as a "help for our bodies by physick, for our estates by law"; thus fixing his place as an ideal medico-legal practitioner. His son, John Winthrop, Governor of Connecticut, was an educated physician.

The second office in the gift of the people of Massachusetts, that of lieutenant-governor, has been held by three members of this Society, David Cobb (who presided as a judge when he was not practising medicine), Henry Halsey Childs and Elisha Huntington.

The executive council of the commonwealth has had many medical representatives in its membership in the course of its history. They have done excellent service in advancing the interests of our profession whenever occasion offered. This was especially the case in 1877, when the assistance of the late Dr. William Cogswell was of great value in the reform of the methods for conducting investigations of deaths by violence.

In municipal administration, our profession has

shown its adaptability for public affairs in numerous instances. Repeatedly, medical men have demonstrated their acceptability in the office of mayor and in various subordinate positions in city and town government. When we read, a few months ago, in the obituary notice of one of our oldest and most esteemed associates, that he had served continuously for forty years as the keeper of the records of the town in which he lived and died, we had good proof that his capability and fidelity were recognized by his fellow citizens. So, too, we may recall the admirable services of our brethren in the conduct of school-administration and in the interests of free education under the fostering care of the commonwealth.

Again, in the management of the public institutions belonging to the State, medical men have found a congenial field for the exercise of their wise judgment and executive ability. Ever since the establishment of the first lunatic hospital by the State in 1832, at Worcester, the boards of trustees of these and similar foundations have welcomed the acquisition and assistance of physicians as an essential element of their success. The credit for the progressively humane methods in the treatment of the dependent wards of the State in hospitals for the insane must be divided between the able medical superintendents of those asylums and the medical men in the boards of government. If one desired a demonstration of the executive ability of physicians, let him compare the State Almshouse at Tewksbury, as it is

to-day, with its scandalous condition before 1876; its discipline, its fine hospital service, its freedom from abuses, are in sharp contrast with the methods and results which characterized its management before a physician took charge of it under the authority of the legislature.

Why should not the executive efficiency of men trained as physicians be utilized still further in our public institutions? In India, the governorship of jails and the position of medical officer are combined in the one person of a medical man, whose united functions result in great advantage to the institutions and economy to the State. Doctors of medicine who can manage great hospitals, can govern penal reformatories; and convicts, as well as lunatics, would be none the worse if their full sanitary supervision were in the hands of specially trained officials. Who can doubt that the discipline of a convict prison would be improved if it were manifest that judicious care were taken to maintain the health of the inmates by the humane and practical methods of medical resident officers? By the gradual education of junior medical officers in this service, a supply of executive officials would be at the disposal of the State for the management of its correctional institutions in a proper and acceptable manner.

There is one chapter of the Massachusetts laws whose administration has always been an agreeable duty for the members of our profession. The statutes relating to the public health have been especially interesting to medical men, and the in-

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telligent practical application of them has always had its best agents among physicians. Ever since the board of health of Boston, ninety years ago this summer, fitted up an observation hospital on Noddle's Island and invited Dr. Benjamin Waterhouse and other physicians to demonstrate upon the patients therein the immunity from small-pox infection which Jenner's recently discovered operation of vaccination bestowed; nay, ever since Dr. Boylston, nearly a century earlier, fearlessly and successfully acted as the champion of variolous inoculation, and showed it, in the face of bitter prejudice and opposition, to be a means of protection against the justly dreaded and disgusting scourge which had swept periodically through the community, Massachusetts has found among her physicians the most zealous advocates of sanitary legislation, and the most faithful servants in executing her enactments. To the public, this paradox has always been a mystery. Why medical practitioners should desire earnestly to hinder or control the spread of disease, when their livelihood and material prosperity depend on its presence, and their reputation for skill and success is directly related to its prevalence, is a problem which the ordinary intellect is unable to solve. The reason is that the vulgar apprehension has not grasped the difference between a vocation and a trade. The enterprising tradesman is not accustomed to place obstacles in the way of the successful development of his business, and he cannot understand why physicians do not follow

his example. But we are not engaged in the pursuit of a trade, and our methods are on a higher plane than those of mercantile or of mechanic industries. We look to the welfare of humanity as our first and fundamental object, and the practitioner who forgets this and seeks primarily the gains which are the objective reward of diligence is not true to the high purposes of his profession. The majority of physicians follow the more unselfish course and are therefore ready always to aid and to adopt measures which will protect the people from preventable suffering. It is, therefore, not surprising that they are earnest allies of the State in the administration of sanitary laws. I refer, of course, to the statutes relating to municipal sanitation in its broadest sense, including those enactments, to which I have already alluded, requiring the service of physicians in giving information concerning the presence of infectious diseases and the registration of births and deaths.

And what a comprehensive array of enactments affecting the public health the statute books of Massachusetts present! The silence and indifference of the State with regard to curative medicine is in the sharpest possible contrast with the number and variety of laws relating to preventive medicine. There would almost seem to be a design in this, an evidence of a purpose, however chimerical, to make our profession a superfluity, needing no legislative regulation, by abolishing through manifold acts of the general court the diseases which call into exercise our therapeutic

skill. However this may have been, the authority with which the legislature has endowed municipal boards of health in this commonwealth is extraordinary.

Recall, for a moment, the almost bewildering array of laws which are at this moment in force, designed to promote health and resist the encroachments of disease. The board of health of your city or your town has the power, under the statutes, re-inforced by decisions of the Supreme Court, to interfere with personal and property rights in the most arbitrary fashion, if only the interference is in the name of the public health. It may remove sick persons from their homes and from the care of their friends and family physician, and place them in hospitals specially provided; or it may depopulate a neighborhood, and leave the patient in sole and isolated possession of it. It may turn back travellers who come from "infected places" across the boundary line of adjacent States, and may detain at quarantine those who come by sea from other ports. It may forcibly break open and enter any house in search of baggage, clothing or other articles supposed to be infected with diseases dangerous to the public health, and may take possession of other premises for the safe keeping and storage of such articles. It may call unpleasant attention to your dwelling by placing danger signals upon it if infectious disease has unhappily entered there. It may forcibly enter any building or premises for the purpose of examining into and destroying, removing, or preventing a nuisance,

source of filth or cause of sickness; and it may, in like manner, in its own way, but at the cost of the owner, remedy undrained land on which stagnant water stands. It may compel you to abandon the conveniences of the ancient cess-pool and privy vault on your grounds and, at considerable expense to you, connect your dwelling with the public sewer. It may surprise you by a declaration that a disease which you have not deemed to be formidable is hereafter to be classed as "dangerous" to the public, and that every case under your observation is to be reported, and the method of disinfection at the termination of the case is subject to its approval. It may vacate and close dwellings which it deems unsuited for habitation and may prohibit the exercise of any offensive trade outside the limits which it assigns. It has control of the cemeteries in which your dead are buried, it licenses the undertakers who have charge of the burial, and it stands in the way of a burial until the medical certificate of the cause of the death is satisfactory in form and substance.

This epitome of the powers with which every local board of health in Massachusetts is clothed, gives but a hint of the profusion and force of the laws which, since the establishment of the first board in 1799, the State has enacted. Substantial penalties are attached in case of their violation, and it would seem that every sanitary emergency and exigency had been anticipated. And it is worthy of remark that, with all this array of authority at their command and with the judicial

officers of the State under an obligation to render executive aid in case of need, the boards of health have never acted in an arbitrary or unjustifiably severe manner. Too often, indeed, sanitary administration has been characterized in some communities by deplorable laxity and shiftlessness, rather than by offensive zeal. The cause of this inertia lies in the lack of a genuine public spirit which should support and compel the enforcement of the laws. If our people would show for sanitary precautions and regulations the sympathetic interest which is deserved, the authorities who administer the health laws would not be indifferent. Wherever a city or town has provided for its people a proper local board of health, with an intelligent, energetic medical man as its executive officer, the result has been satisfactory, because physicians, better than the ordinary citizen, know what can be accomplished as well as what is needed.

There is an impression that the State Board of Health is endowed with an authority similar to, if not greater than, that of local boards. This is an error. The functions of the State board are largely advisory; its powers as a purely executive body, to make orders and enforce them, are quite limited and are inferior to those of the local board of health of the smallest town in the State. It has authority to make investigations concerning the causes of disease, to diffuse sanitary information among the people, to conduct experiments relative to the disposal of sewage, to recommend measures

for the prevention of the pollution of the water supplies of cities and towns, and to advise persons or corporations concerning proposed water supplies or plans for sewage-disposal, its recommendations and advice being a preliminary requisite before legislative action. It has special duties assigned to it with reference to the adulteration of foods and drugs, and may, by its agents, bring offenders to trial. Without doubt, the fact that the field of its operations is comprehensive, untrammelled by municipal limits and embracing whole communities and large territories, adds value to its conclusions and recommendations by relieving them of local or sectional influences. It is a pleasure to acknowledge publicly that, in all its investigations, the board has had the hearty co-operation and assistance of the members of this Society.

But the cynic will ask, of what use is all this cumbrous, expensive and complicated sanitary machinery? Of what value has it been to the State? Do not epidemic diseases prevail just as they did before all this legislation was piled up for our admiration? Has not pandemic influenza stalked defiantly around the world again and again in the last three years, without the least hindrance from any source? Do not scarlatina and diphtheria enter our households and take possession in spite of all precautions, official and personal, devised to bar them out? Do not the children die by hundreds in August, and the grand-parents perish by the score in March, just as they did a century ago? Has tuberculosis been controlled?

To all such pessimistic questioning, full answer has been made in the impressive address to which you listened three years ago,[1] and in the thoughtful essay[2] of last evening. It is unnecessary for me to add to their authoritative statements. But it is not improper to remind the sceptic that the general mortality rate has been made to diminish; that the average duration of life has been appreciably increased; that in communities which use vaccination with reasonable fidelity, small-pox is rare enough to be a luxury; that typhus fever, once so common, is now a genuine medical curiosity, and to most physicians is as unfamiliar a subject for his clinical study as a case of the plague. Is it of no consequence, moreover, that dwelling-house architecture has followed the admonitions of physicians and sanitarians and that ventilation and drainage are no longer left to chance? Is it of no importance that the water-supplies of the State are more carefully protected from pollution than ever before, and that every new supply is critically tested in all its relations, physical, chemical and biological, before it is accepted? Is it of no significance that the men and women of to-day find in athletic exercise and out-door recreation the surest road to robust health? These are some of the queries that are suggested by doubts of the unbeliever in sanitary teachings and practice. To you, who have always been in harmony with the progressive spirit in

[1] The Annual Address for 1889, by Dr. H. P. Walcott.
[2] The Shattuck Lecture for 1892, by Dr. J. F. A. Adams.

Massachusetts which is embodied in her health laws, obstructive criticism will appear unworthy of serious reply. Preventive medicine looks to the future hopefully. Many of its problems will be solved by the trained bacteriologist whose greatest achievements are still before him. Public sentiment will approve more stringent methods in the preventive management of communicable diseases. Tenement blocks for the poor will be better adapted to their purposes. And in all measures—scientific, practical, administrative—the commonwealth, in the future as in the past, will look to us and our successors as its best allies and most efficient agents for the protection of the people from harmful influences affecting life and health.

There is one other department of the State's affairs to which I wish to refer briefly, because in its administration our profession has been conspicuous. I allude to that chapter of the Public Statutes entitled "Of Medical Examiners." The Massachusetts law relating to inquests is no longer on trial as a questionable innovation; it has passed the experimental stage and is now as permanent and stable as any part of the judicial system of the commonwealth. The practical experience of fifteen years has demonstrated that the legislature of 1877 enacted a law of exceptional value, thoroughly adapted to fulfil the purposes for which it was designed. In all this period, only two material amendments have been made, and neither of these modified the essential principles and methods pecu-

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liar to the original statute; one of these changes simplified the disposal of the bodies of strangers found dead, and the other required publicity of the official records of medical examiners. In all its main features, then, the new Massachusetts method of conducting inquests has remained without modification since it was put upon trial; and, as a piece of experimental legislation, radically departing from traditional and familiar usages, it has accomplished most gratifying and successful results. And the reason for this is easy to comprehend. When the general court of 1877 determined that the venerable but discredited and abused system of investigating violent deaths by means of coroners and their juries had outlived its usefulness in Massachusetts, it was under an obligation to substitute a legal mechanism that should be simple, practicable, economical and trustworthy. And this it did with such consummate success as to challenge admiration. It provided a procedure that accomplished the desired end promptly and without friction. It differentiated the purely medical elements of the inquiry from those which were essentially judicial. It created a medical officer whose sole function it should be to determine, in any case of mysterious or violent death, the anatomical proofs of unlawful acts entering into the cause of death; and it made his conclusions upon this purely medical question the basis for further inquest-proceedings by judges trained in the methods of taking and sifting evidence and required to solve the problem of accountability in

the case. The initial stage, then, of the inquest is always the medical determination of the cause and manner of the death, and for this determination the law provides ample resources.

It is obvious that the responsibility resting on the medical examiner in the discharge of such a duty is not of a trivial character. In simple cases, even, where his observations are but confirmatory of evidence clearly established beforehand, he cannot regard his task as a slight one. Suppose a person to have been murdered by a pistol-shot wound in the presence of witnesses; the tracing of the missile through the dead body, with accurate study of its course, direction and lesions in the various organs and tissues, made and described in such a manner as to be clearly intelligible to a jury and creditable to the witness, is an exercise which calls forth the best activities of the medical mind. But such instances are not those which test the merits of our Massachusetts system of inquests most conclusively. The highest evidence of its value is found in the mysterious cases in which there is entire want of such information as may furnish a correct guide to the examiner in his proceedings; or in cases wherein the facts are purposely and wilfully concealed, or falsely stated, with the intent to cover a crime. A young, unmarried woman dies suddenly in the office of a physician, to whom she has gone for advice and treatment; if the medical examiner believes the doctor's ready statement and his circumstantial account of the affair, he will call the cause of the

death "heart failure" and demonstrate his own failure in the discharge of a delicate duty; but if he recognizes his obligation as a public officer, standing between the community and the commission of crime, he will push his investigation beyond the voluntary statements of interested persons, and he may be rewarded by finding that the fatal issue was the result of an abortionist's manipulations upon a pregnant womb, admitting air to the blood-vessels and causing a death by unlawful violence. Such an instance illustrates the possibilities for usefulness and efficiency which our system offers; it shows that to the qualities of ability, discretion and learning, which the statute requires of medical examiners, there may properly be added a wholesome incredulity in doubtful cases, a conservative agnosticism which refuses to believe that which is not demonstrated.

That the Massachusetts method of conducting these inquiries is acceptable is shown by the entire absence of real criticism, as well as by the cordial approval of jurists who have studied its details. It has commended itself to the authorities of other States, who find in it the indications of a great advance in comparison with the clumsy and inverted coroner system. It is quiet in its operation. It does not, by the exercise of noisy authority, upset and demoralize households overshadowed by recent grief. Its results are certain and tangible. It secures for use at trials for homicide the testimony of trained men well fitted by experience to be witnesses. It has absolutely eliminated all

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scandal and sensationalism from inquest proceedings. It has saved money to the county treasuries, at the same time affording better service to the people. Incidentally, it has gathered a large amount of valuable medico-legal observations in the transactions of the society conducted by the medical examiners, and it has supplied material for a full annual course of practical study in legal medicine to the students of the Harvard Medical School.

The credit for suggesting and initiating the reform which has wrought these results, and for framing the legislative bill whose enactment made the reform practical, belongs to a single member of the Suffolk bar.[1] The credit for making the change an accomplished fact belongs largely to a few representative members of this Society, who persistently and effectively urged the arguments in its favor, and, in the face of determined opposition, convinced the legislature that a new method of inquests was imperatively needed. But the credit of making the law itself, once enacted, a success, rests with the medical men who have been commissioned to administer it. Left to the care of a body of selfish, reckless or weak men, appointed indiscriminately, this law would have quickly fallen into disrepute. But it has not been so left. The corps of medical examiners in commission to-day represents a selection made with care by the executive of the State. From the time of the first appointments down to the present, the office has been

[1] Theodore H. Tyndale, Esq.

kept out of the demoralizing influences of partisan politics, and for this the community should be cordially grateful. The large quota which this Society has supplied to the present ranks of this useful corps[1] contains some of the best representatives of the medical profession in Massachusetts; the same is true of the recent past, and when I recall to your minds the names of Hosmer, and Cogswell, and Russell, and Winsor, among the dead, who while living served in this relation, you will not marvel that the law has been administered successfully, for it has been administered by conscientious medical men striving faithfully to perform their duty. In the last fifteen years, these medical examiners, drawn largely from the Massachusetts Medical Society, have investigated the circumstances of more than twenty thousand deaths, and it is not an exaggeration to say that no method has yet been suggested by which this great medico-legal service could have been discharged so efficiently, with proper guarantees for the protection of the interests of society and the administration of justice.

From this allusion to a special medico-legal function of great responsibility which our Fellows are discharging acceptably, the transition is easy to a consideration of the relationship which our profession, in general, bears to the judicial department of the commonwealth.

III. To state the proposition broadly, the medical man finds himself in a court of justice

[1] Sixty-four out of seventy-three.

under the same exigencies which occur to the ordinary citizen, service on the jury alone excepted. He is either a plaintiff seeking reparation for alleged wrong, or a defendant meeting a charge of wrong-doing, or a witness summoned to testify in an issue to which others are the parties. Although these are the three varieties of necessity which take him, as they take others, out of the routine of daily life, and subject him to novel experiences more or less unpleasant, he is conscious that his vocation as a physician places him in a peculiar attitude unlike that of the layman. And it is these peculiarities characterizing our position in court that I now ask you to consider with me.

As a plaintiff, appealing to the judicial department of the State to settle the issues of a quarrel or to determine the money value of imputed wrongs, or to solve for him other problems of a similar nature, involving the law of contract, or tort, or trespass, the physician is a spectacle of extreme rarity. I think it can be claimed with confidence that medical men, whatever their other characteristics may be, are not noted for litigiousness. They do not readily engage in contention. They are generally too busy to find in the behavior of their fellow-men the occasion for law-suits. Although there is a certain hyperæsthesia which is said to apply to the profession in connection with the subject of medical etiquette, this never finds its way to the gates of the temple of justice; and in the ordinary affairs of life the doctor of medicine is seldom found on the hither side of the abbre-

viated Latinism which in the court docket stands as a low barrier over which the parties to a suit defy each other. If litigation brought into being by physicians were the only business which engaged the attention of juries or equity sessions, the courts would have long vacations and the practitioners of law would find other more profitable employment. The doctor in court as a plaintiff, then, need not detain us longer.

But with the doctor in court as a defendant, strenuously bending his energies and using his resources to resent an imputation upon his skill and care, the case presents a theme of serious interest, for it concerns the whole domain of our legal rights as medical practitioners. Most of the suits in which physicians are the defendants are actions instituted by former patients to recover damages for alleged malpractice. The fact suggests, at the very outset, some consideration of the obligations which the law imposes on physicians and surgeons in their treatment of the sick and injured persons who employ them.

To the medical man as he stands in the presence of a person who has summoned him for professional aid and counsel in time of suffering, the law says: "You were under no obligation to respond to the summons which called you to this bedside. This person had no lawful claim upon you for your services. However strongly selfish interest, expediency, prudence, or humanity may have urged you hither, you had the right to decline the call and to remain at home in comfort, if you so

desired. But having responded, and having undertaken the care of this case, you have assumed certain obligations which the law fully recognizes, and which you cannot avoid, except at the risk of losing both money and reputation.

"Your obligation is that of an implied contract which, though less formal and specific than an express contract executed in writing, is not less binding it its nature.

"You must continue in attendance here, and may not abandon the case or desert the patient without reasonable cause, or without allowing sufficient time for the procurement of other attendance.

"In undertaking the medical care of this person, you shall attend upon him with reasonable diligence and skill, and you will be answerable to him for any want of ordinary care, diligence and skill which results in his injury.

"Under the obligations of the implied contract, in accordance with which you are employed, you do not warrant or insure that all the results of your attendance shall be satisfactory, that there shall be a perfect recovery, or that your treatment shall effectually stand in the way of unexpected complications.

"Your judgment relative to the application of certain remedies or modes of treatment may err, and the law will not hold you responsible for ill results growing out of errors of judgment. But you engage, under the law, to treat this case in such a way that any injury which the patient suffers, in its course or subsequently, cannot reasonably be

traced to a neglect of competent and ordinary care and skill on your part as its proximate cause."

Such are the principles established by the common law as the intangible environment of the medical or surgical attendant for his guide and control under the usual circumstances of his employment. They are the rules which underlie and govern those actions of tort wherein the claim is set up that negligence and unskilfulness on the part of the medical attendant have caused injury and distress to his patient, and that money will be the proper remedy to heal the wrong imputed to him. And it is reassuring to record the fact that these rules and principles, however difficult they may seem to be as practical guides, have been in effect a shield rather than a menace to the interests of defendant physicians, and that the cases are fortunately few in number in which it can be said that unjust and unfounded verdicts have been returned by juries upon the issue of imputed negligence and unskilfulness; where verdicts against the defendant have been recorded, the testimony has usually left little question that the decision was right, because the negligence charged was really inexcusable on any reasonable ground.

But while this is true concerning the issue of suits for damages, it is also true that the law interposes no obstacle in the way of initiating such suits. Let us suppose that the medical attendant has done all that the law requires in the care of his case, that he has to the best of his ability used ordinary and reasonable skill and diligence and

has avoided all measures that could be criticised as experimental, he may nevertheless, through circumstances and conditions over which he has no control, find himself a defendant in an action of tort brought by his patient. Perhaps the dislocated shoulder which he has reduced months ago, with proper attention to all surgical details, persists in giving pain and in refusing to resume its mobility. Perhaps the fractured femur is restored to duty with a permanent and irremediable though unavoidable shortening. Perhaps the broken forearm, when taken out of the splints, has an uncomely deformity in spite of the most assiduous care. Or, in a puerperal case, perhaps the woman on her recovery finds that she has a disgusting leakage of urine through a fistula in the vesico-vaginal septum, and she remembers that the doctor used forceps to deliver her; but she forgets that she consented to their use only after hours of ineffectual labor, during which the child's head lay low down, without progress, pressing upon the very spot that is now the seat of her misery. In any of these events, whatever has happened out of the ordinary course, it is easiest to blame the attending physician for it; and the next step is equally easy, the initial step in the proceedings for what is called "getting satisfaction." However clear the attendant's conscience may be that he is not blameworthy; however positive his memory may be that he has done nothing and has omitted nothing in his attendance that was in violation of the soundest teaching and

the tests of experience, these will not save him from the trouble and expense of defending himself against the charge of negligence and unskilfulness as it is formulated and openly made in court. The story is an old and familiar one. Too often the motive that initiates the suit and urges it forward is a most unworthy one, and is scarcely to be distinguished from the wickedness of blackmail. Too often it is nurtured and stimulated by lawyers more hungry for plunder than ambitious for a good name. Too often it is encouraged by the unfriendly words and actions of professional rivals. Sometimes, no doubt, a suit is well founded and the complainant really believes in the justice of the complaint, and is candid in accusing the physician of carelessness; but such apparently well-founded instances are exceptional, as we all know, and they cannot bear comparison with the number of suits brought with discreditable motives. Over these prosecutions, the physician is powerless to bring any control; however strong his defence may be, he cannot prevent a trial, with all its annoyances, risks and costs, except by adopting the course of paying money to settle the claim out of court,—a course which any self-respecting medical man will not adopt, though sorely tempted to escape thereby all the wretched miseries of a jury trial.

This constant menace of unjust lawsuits which every physician, and especially every surgeon, has constantly before him, as the law is now practised, is an evil which we may properly criticise and

denounce. There is one remedy for it which might well have general application; if every complainant of the class we are considering were required, upon initiating the suit, to demonstrate his sincerity in the justice of his cause by filing a sufficient bond, with sureties, to indemnify the defendant physician for all the costs of the trial if the jury should give a verdict unfavorable to his claim, we should hear far less of these iniquitous suits than we now do.

It has often been suggested that, in view of their liability to unwarranted claims for malpractice, medical men would do well to organize co-operative defence unions for their own protection. Such a suggestion has much to make it attractive, and it has actually borne fruit in England in a flourishing and fully equipped association prepared to assist its members when they are brought to bar as the victims of irritable, or avaricious, or depraved human nature. The way is so easy for ungrateful or unprincipled convalescents to institute charges, and it is so burdensome and costly to refute such charges, that a medical defence union appeals to the imagination very strongly as a real relief. But while such a fellowship might serve to deter the unscrupulous from bringing suits against physicians, in such suits as are pressed to trial, the appearance of a medical defendant backed by the money and the sympathy of a numerous company of his professional brethren might have a reactionary effect upon jurymen, who are notoriously ready to render verdicts against corporations and corporate interests.

But the incivilities of the so-called civil suits which we have been studying do not exhaust the opportunities offered to physicians to become defendants in legal proceedings. There is a kind or a degree of negligence and unskilfulness which, while offering no bar to an action of tort, is sufficient ground for the State's interference and may become a subject of investigation on a criminal charge. It is when the death of a patient is charged to the carelessness or ignorance of the attending physician that the machinery for criminal prosecutions is set in motion for his discipline. All law-writers use nearly identical terms in their definition of the degree of dereliction which constitutes criminal malpractice; and this general definition is so tersely expressed by Mr. Bishop in his work on Criminal Law that I quote it: "If a person, whether a medical man or not, profess to deal with the life or health of another, he is bound to use competent skill and sufficient attention; and if he cause the death of another through a gross want of either, he will be guilty of manslaughter."

It is, then, that degree of malpractice which the law characterizes as "gross" which renders the practitioner liable to punishment under a criminal charge. As in the law of civil malpractice, so here, definitions hardly define; for the term "gross" conveys a relative and not an absolute meaning, and in many cases where a man's liberty, or possibly his life, depended on the decision, a real difficulty might easily arise in applying it.

When we remember that such a decision is to come from twelve unenlightened and perhaps prejudiced jurymen, we may well contemplate with something akin to awe the immunity of medical men, and feel a sense of gratitude that all deaths are not made the subject of judicial investigation. On the other hand, however arbitrary the criminal law may be in theory, the leading cases which are reported demonstrate that, in practice, medical defendants under the accusation of criminal negligence have been dealt with leniently.

Chief Justice Parsons, in his charge to the jury in the notorious Thomson case, said there was no reasonable doubt that the patient had died by the unskilful treatment of the prisoner and that the latter's ignorance was very apparent; but that if the prisoner acted with an honest intention and expectation of curing the deceased by his dosing, although death, unexpected by him, was the consequence, he was not guilty of either murder or manslaughter. The defendant's acquittal followed promptly. This statement of the law served as a precedent in Massachusetts for seventy-five years. It has been somewhat modified within the past ten years, the Supreme Court having set aside a convicted charlatan's reliance upon it; in this latter case, it was decided that a verdict of guilty was correct because the death, which followed the prolonged swathing of a woman's body with flannels saturated with petroleum, was the result of reckless and foolhardy presumption judged by the

standard of what would be reckless in a man of ordinary prudence under the same circumstances.

But it is incomprehensible that any individual in my present audience can have any personal or direct interest in these legal decisions concerning homicidal malpractice. The judicial history of Massachusetts contains no mention of any reputable medical man in the position of a defendant indicted for the destruction of his patient's life through gross carelessness or reckless and foolhardy presumption. Such an exhibition is monopolized by the representatives of quackery.

Let us turn, then, to a far more familiar relationship between medical men and the courts of law, that sustained by physicians as witnesses. Rightly considered, the function of a medical witness establishes one of the most dignified and honorable positions in the service of the commonwealth which a member of the medical profession can discharge. That the function has been abused and has experienced a measure of disrepute, is quite true. That there are certain features of it which are deplorable and most unsatisfactory is also true. But it is likewise true that, with all the criticism and disparagement of which it has been made the subject, medical evidence will continue to be an indispensable element in judicial proceedings, and the medical witness, if he be properly equipped for his service, if he be duly appreciative of the real responsibilities which rest upon him, and if he studiously avoid certain well-defined errors and evils which have grown up in connection

with medical testimony, has it in his power on every occasion to command the respect of all who observe him, and to be, in the court of justice as in the sick-room, the representative of sound learning and of manly deportment.

It has been customary, in treating of medical evidence, to classify medical witnesses as of two distinct varieties, according to the assumed character of their testimony; they are regarded as ordinary witnesses if they testify to facts, and as expert witnesses if they express opinions or undertake to interpret facts. This purely arbitrary distinction has had a mischievous tendency affecting every medical witness, hampering his usefulness on the witness-stand and opening the way to faulty practices. The differentiation of facts from opinions is of service practically, so far as physicians are concerned, in establishing a basis for remuneration and in impressing juries favorably by creating a presumption of superior attainments on the part of so-called experts. But if we recall the usual methods under which medical witnesses are employed, we shall see how artificial is such an attempt at classification. The truth is that nearly every piece of medical testimony is a composite of facts and opinions in which the facts largely predominate. But they are medical facts, the correct determination and statement of which require medical knowledge, skilled training, and a special aptitude. In a trial for homicide, for example, the medical examiner who describes the post-mortem appearances observed at the autopsy is dealing with

anatomical facts, and the correct inference of the cause and manner of the death rests, as an incident only, on these many ascertained data, the fruit of his observation. So, too, when the chemist exhibits to the jury the arsenical mirror which is the result of his analysis of suspected organs or remnants of food, he is submitting, not opinions, but incontrovertible facts. When Professor Wood, in a recent capital trial in a neighboring State, described the methods and stated the results of hundreds of micrometric observations of blood-globules recovered by him from stains upon clothing worn by the accused, and testified that his observations were consistent with the view that the stains were made with human blood, he was giving medical facts. When Professor Austin Flint testified that in his microscopic and chemical examination of the material found under the finger-nails and on the clothing of a degraded criminal accused of the murder of a woman and the mutilation of her body, he detected crystals of tyrosine and other substances which must have come from no other part of the intestinal tract than that found cut open in the victim's abdomen, he was giving an indisputable physiological demonstration of objective facts, which fastened the guilt of the homicide upon the prisoner. When Professor Jeffries Wyman, in the memorable case which so engrossed public interest in this community in 1850, established by his evidence the identification of a mutilated human body, the work that he did was not guess-work, but was again a demon-

stration based upon accurately observed anatomical material.

These are illustrations of the highest type of medical testimony, commonly called expert, but really an extraordinary grade of ordinary testimony relating to facts. The same principle is seen in the numerous civil suits growing out of imputed negligence, whereby accidental injuries result. The testimony of medical men connected with these cases is largely directed to the description of symptoms and conditions of a purely physical and objective character; to the establishment of the proof of genuine lesions and the elimination of what is subjective or feigned; to the reasonable connection of well-ascertained causes and effects. Even in the comparatively rare cases in which a medical man answers purely hypothetical questions, and gives his opinion upon assumed facts, of which he has no personal proof, the examination does not end with this exhibition of the expert's technical office, but wanders away into the various regions of medical knowledge pertinent to the questions at issue; the hypothetical recedes from view and the actual becomes prominent.

Conversely, the physician who responds to a subpœna as an ordinary witness, without any intimation that his testimony will extend beyond simple matters of fact, is generally asked some questions when on the witness-stand which call for the expression of an opinion; and this entitles him to recognition and remuneration as an expert.

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He may evade the dilemma by declining to answer the questions, and may, for his reward, have a mercenary element imputed to his motives. Or he may take the risk of personal embarrassment by attempting to formulate on the spot opinions on difficult issues adroitly presented. In either event, the fact remains that a purpose has been shown to use him as a medical expert when his call to court gave no suggestion of such a purpose.

The conclusion, then, which I wish to draw from these considerations is that all medical testimony is of the nature of skilled service, and deserves appreciation as such. The State has no right to place the usual low value on evidence which, though denominated "ordinary," implies under every possible contingency an adequate degree of learning, skill and training in medicine. It has been held repeatedly that knowledge, in science or art, is its possessor's capital, accumulated through years of study and application; and that neither the commonwealth nor any individual can make any lawful requisition upon that capital without substantial reimbursement. This is the well-recognized and universally applied rule governing the employment of medical experts, who go to court to state opinions with facts. Why should not the same rule attach to the services of surgeons and physicians who, heeding the peremptory summons, respond as witnesses to give evidence of clinical facts, of physical appearances, the presence or absence of signs and symptoms, and all those other matters the correct observation

and description of which require a definite amount of knowledge, the fruit of much patient study or long experience? The demand which in the name of the commonwealth is made upon medical men, wasting their time in tiresome delay, interrupting their professional routine of duty, subjecting them to disagreeable and irritating experiences, extorting from them facts acquired under the confidential relations of the sick-room, is not one which, under prevailing conditions, is answered with cordiality. It is among the unpleasant incidents of professional life. It reminds us that of all departments of our practical work, the medico-legal service is the only one which we cannot control, or evade, or transfer to others. The call of a judicial summons is imperative, and physical disability will alone excuse its neglect. When, therefore, we consider the nature of the testimony which the medical witness will impart, its indispensable value in determining disputed questions, and the degree of technical knowledge required for its correct presentation, we do not exceed propriety if we ask that the State shall in some way provide fit methods for the adequate reward of such involuntary service, or shall place all purely medical testimony in the relation now held by expert testimony and subject to the ordinary customs of preliminary adjustment and agreement.

One other feature of medical testimony solicits attention; it relates to the deportment of the witness in court. The ideal medical witness possesses these qualities: his demeanor is dignified and un-

constrained; he has large stores of well-seasoned knowledge; he is quick in apprehension, firm and immovable in his convictions, but conservative and judicial in reaching them; he has a retentive memory, a reserved courage and an imperturbable temper; he is terse, direct, clear and concise in statement, and especially is an adept at translating every technical term into words and phrases clearly intelligible to every juryman; he abhors garrulity, flippancy and trickery; he aims to be candid and strives to be impartial, disinterested and free from bias.

Sometimes, though very rarely, one sees a physician on the witness-stand who represents faithfully all these requirements; he is the object of our emulation and envy. Much more commonly, however, medical testimony illustrates characteristics quite in contrast with the ideal. The physician whose methods on the witness-stand we do not desire to copy is garrulous, affected, pedantic, flippant, ready to engage in controversy, dogmatic, and above all saturated with partisanship. Of all these faults, the last is the most common and conspicuous and the one which has brought the greatest reproach on medical men as witnesses; it is this which has led judges on the bench to disparage and belittle medical experts; which has caused writers on jurisprudence to discredit their value; and which, in practice, has induced juries to ignore their testimony altogether in trying to reach a verdict. But while admitting that partisanship is a too common element of medi-

cal evidence, I insist that it is an evil for which medical men should not be held responsible. It is the unavoidable and legitimate fruit of the conditions under which the modern practice of the law is pursued. The physician in the sick-room does not exhibit the disposition here depicted; but place him under the novel and subtle influences of the court-room and he becomes another creature. In this new relation, he inevitably finds himself subject, in greater or less degree, to peculiar temptations. For nearly all that is objectionable in the exhibitions of partisanship made by medical witnesses, I blame the methods under which such experts are employed; the system, and not the witness, is at fault. A case, for example, occurs which offers an opportunity for the use of medical testimony. You receive a politely insinuating invitation from the counsel, to serve as an expert. You do not inquire very closely into the grounds that have determined the selection; you feel complimented, at all events, and you consent to be retained. Now, having fully committed yourself to the service of your employer, your independence is almost necessarily laid aside. You are expected in preparing for the trial to develop all the elements in the case favorable to your employer's side only. The advocate consults with you, nourishing in you a controlling partiality, and doing all in his power to stimulate a cordial interest in his client's cause. The witness thus appproaches the trial, expert chiefly as a partisan medical advocate. Against the insidious influences which

promote this surrender of mental equipoise, few physicians could successfully defend their judgment. Ordinarily, the exigencies of his service, his sympathy with the client's claim, his sense of obligation to fulfil an implied contract, all draw the medical witness from a judicial independence.

Then at the trial itself, still more compulsory influences encompass him. He now finds himself in the arena, marshalled with others to defend his own side, to defeat the opposing side. He is harassed by the technical limitations of the rules of evidence. Through the inability of lawyers to conduct acceptably an examination on medical subjects, he is made inadvertently to state views which, under other circumstances, he would not think of supporting. The leading questions with which the cross-examination bristles ensnare him into unexpected and embarrassing corners, out of which the easiest way lies through extraordinary expositions of medical knowledge. Professional pride compels him to defend stoutly his position, a retreat from the ground being deemed worse than the blunder which took him there. First, last and always, he is to shape his course with the single aim of helping to win a verdict favorable to his side, and of earning thereby the dollars which are his reward for faithful service.

It is cause for regret that the English and American methods of employing medical experts have fallen away so far from the primitive practice. Under the Roman law, the physician in court as an expert witness held a relation of exceptional

honor and responsibility; he was *amicus curiæ*, an independent and unprejudiced interpreter of medical facts. He was summoned to instruct the court and jury in matters of which they had, presumably, an imperfect knowledge. His duty was to aid in establishing the whole truth. In such a position, a physician occupied an office of honor. He was chosen because of his fitness; he truly represented his profession. And in still more recent times, even down to the present period, the system in vogue in France and Germany is far in advance of our own in securing the end which the theory of medical expert testimony designs. Either under the German plan which provides for official experts, or under the French method which leaves the choice and employment of the expert to the discretion of the court, the medico-legal results are admirable and in striking contrast with the procedures with which we are familiar, and which permit a suitor to come into court with a company of medical Hessians enlisted to defeat his opponent.

Now, what can be done—and this is the one important question for consideration—to modify, or, if need be, to revolutionize these unsatisfactory methods? Without pausing to review the various propositions that have been made from time to time for accomplishing this end, I remark at the outset that, as may readily be inferred from what has been presented, the first thing to be desired is the removal of the medical witness from the influences and temptations of partisanship; he must be

lifted far above the plane of bias. This is the corner-stone on which the entire new structure must be built, if the evils of which we complain at present are to be eliminated. Other provisions are mainly correlative and subordinate details growing out of this.

To secure this end, the best way, because it is the most in accord with American notions of fairness, is that which would provide that the medical expert in any action at law, civil or criminal, should be the choice of the two parties interested in the litigation; or, in the event of their disagreement or neglect, the choice of the court.[1] Grant this primary principle, and all other secondary questions and exigencies will find comparatively easy adjustment. The advantages of such an innovation, both theoretical and practical, are too plain to be mistaken. Theoretically, such a plan would secure experts in fact as well as in name, since it would obviously be for the interest of all concerned that the best available medical judgment should be obtained upon technical questions involved in the issue on trial. Instead of the present deplorable exhibitions, so amusing to lawyers, so discreditable to our profession, so subversive of justice, we should see a true representative of medical science, selected because he is recognized as such, appearing in court as the interpreter of the medical data established in the

[1] The practicability of this method was demonstrated by the New Hampshire Supreme Court in a case which occurred during the preparation of this discourse.

evidence. We should see him the impartial exponent of the most recent authoritative advances in science, as well as of the settled principles which are the fruit of long experience. We should see him, with the same judicial independence which the presiding justice himself must display, passing judgment, without fear or favor, on matters which legitimately fall to his office as an expert. There would be little danger that this altogether honorable function would fall into unworthy hands under such a system; the man chosen would, from the necessities of the case, be well known as the possessor of knowledge fitting him to comprehend and to elucidate the points presented in the testimony. The man of pronounced and peculiar views, the man of hobbies, would not be sought; his judgment is already discounted.

In practice, the expert thus selected would make such investigations as the case demanded, would listen to all the testimony, and at the proper time would report his conclusions, either as oral evidence or, preferably, in the form of a written statement. Here would occur an opportunity for professional distinction. The name of medical expert, instead of conveying with it a questionable flavor, would become a term of good repute, attracting rather than repelling the master-minds in our profession; while the many-sided questions presented in legal suits and actions would offer occasions for medico-legal reports such as have made Germany and France confessedly the leaders in forensic medicine.

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But at just this point, the typical barrister, with a gesture and in tones familiar to those of us who have ever served as witnesses, says: "Stop a moment! I object!" And when asked to state his objection, he replies: "I object because such a scheme would interfere with the constitutional right of the individual citizen to defend his life, person, property or character by producing 'all proofs that may be favorable to him.' I object because when I undertake to prosecute a suit at law or when I am engaged to defend a client, I wish to know precisely what the evidence favorable to my cause is to be; I have no intention of remaining wholly ignorant of the medical conclusions up to the time of the expert's appearance in court. Moreover, I object because I will not waive my control over all accessible proofs that will aid my purpose. I am in court theoretically to see that justice is administered; but I am here in reality to do what I can to win a verdict for my client, and I wish, in order to secure that end, to employ all lawful means, including medical evidence of my own choosing; and if this evidence is skilfully warped and stretched to meet well the exigencies of my claim, it will be so much the more useful and acceptable." This is the lawyer's view of the matter; and it is this spirit which has hitherto stood as an insuperable obstacle in the way of a much needed reform of the present methods. It is a purely selfish spirit held by a large part of the legal profession, but repudiated by a few conspicuous and honorable exceptions. It will continue to offer

objections to the advent of better procedures, however fully it may have been demonstrated that they are entirely feasible and satisfactory in practice.

Meanwhile, we as physicians have a plain resource. When required to discharge the duty of medical witnesses, let us diligently aim to illustrate a high standard. Let us avoid well-recognized errors to the utmost of our ability. Let us decline to act simultaneously as medical advocates and medical witnesses. Let us endeavor to give our testimony with the same candor and the same independence which would characterize our statements if instead of the peculiar environment of a court of justice, we were in the presence of an audience of friendly, but critical, medical associates. Difficult as such a duty is, it is not impossible of performance.

IV. This review of the relationship which our profession holds toward the commonwealth will be incomplete without some reference, in conclusion, to a still higher obligation resting on us. It is the obligation of loyal citizenship, involving duties superior to any of those which I have undertaken to discuss. Men sometimes speak of citizenship as a privilege, to be used or laid aside with easy indifference. Properly considered, it is much more than this; it is a living trust, a priceless heritage, involving duties as well as rights. In the presence of educated physicians, there is no need to emphasize this. They recognize their obligation and their opportunity,—their personal

obligation of earnest loyalty, their opportunity, through the place they hold in the community and in the household, to raise the level of civic virtue by precept and example. To them, the service to the State which the best type of citizenship presents is not expressed in political zeal, in greed for office, or in an active partisanship which in medical men is always especially offensive and objectionable. It means, on the other hand, absolute independence of all machine methods in politics. It leaves practical politics to "professional" politicians, but it never fails or omits to register its convictions through the agency of the ballot. It is found in sympathy with all reasonable methods of moral and social reform, but avoids impracticable radicalism and sensationalism. It stands for popular education and defends the public schools from all assaults, overt or insidious, that would impair their usefulness and freedom. It insists on fidelity and honesty in official station. It aims to aid in shaping a healthy public opinion upon all matters pertaining to the welfare of society and the elevation of mankind. It protests against the fastidious indifference which too often marks the attitude of educated men toward civic affairs. When the nation's life is assailed, it is found at the front represented by such men as Derby and Otis, and Sargent, and Hooker, and Bell and Lyman, adding new lustre to the proud title of Massachusetts volunteers.

Fellows, these closing years of the nineteenth century are making an extraordinary record of

progress in all that pertains to the science and the art of medicine. The brilliant, almost audacious, achievements of modern surgery and the beneficent triumphs of rational and preventive medicine, inspire our admiration and stimulate our zeal. In the rapid movements of our noble profession along all the lines of advanced development, we find it difficult to keep our leaders in sight; star-eyed science certainly does not encourage loitering on the part of her votaries. But while we strive to keep in touch with this spirit of progress in all that belongs to our domain as physicians, let us not forget the claim which the commonwealth may properly make upon us as citizens. Let us seek earnestly, each in his own community, to illustrate the highest ideals of loyalty and fidelity. So may we, in a double sense, as physicians and as citizens, discharge our duty to humanity.

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ARTICLE XXII.

THE SHATTUCK LECTURE.

THE PREVENTION OF DISEASE IN MASSACHUSETTS.

By J. F. ALLEYNE ADAMS, M.D.
OF PITTSFIELD.

DELIVERED JUNE 7, 1892.

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THE PREVENTION OF DISEASE IN MASSACHUSETTS.

Mr. President and Fellows
of the Massachusetts Medical Society:—

The professional life of the founder of the Shattuck fund extended over the first half of the present century. Preventive medicine, as a science and an art, had in the United States as yet taken no root; but, in the prophetic minds of the medical thinkers of that time, the seed was germinating which was in the next generation to put forth the tender leaf, and in our day to grow into a goodly tree. Science and philanthropy united in teaching these wise medical fathers that to prevent disease is even better than to cure it; and in the front rank of these scientific philanthropists was Dr. George Cheyne Shattuck. In selecting therefore for this paper a title relating to the prevention of disease, choice has been made of one of his favorite themes. In confining it within the geographical limits of the Commonwealth of Massachusetts, respect is had to the patriotic preference expressed in the terms of his bequest.

To what extent is it possible to prevent disease in this Commonwealth? What has been accomplished in this direction, and what more remains to be done? What are the special needs which to-day are calling for concerted action on the part of the medical profession? In asking your attention to a consideration of these questions, I feel confident of a sympathetic hearing; for the subject is one in which the Massachusetts Medical Society has not only a lively interest but a peculiar title of proprietorship. It cannot be wholly relegated to health officials and special

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associations, for it is the medical practitioners, as a body, who give vitality to the work. It is the Doctors who, in their daily intercourse with the people, are educating them in sanitary matters, it is the Doctors who have been instrumental in the enactment of sanitary legislation, and it is the Doctors who stand behind the health authorities with ever ready help. The Massachusetts Medical Society is imbued with a true missionary spirit. Its members gladly spend themselves in this cause, which not only brings no pecuniary return, but even threatens to deprive them of a livelihood. Its efforts for the prevention of disease began before any official action was inaugurated. To us as a Society belongs much of the credit for what has been done, and upon us largely rests the responsibility for its effective continuance.

It is well known that Massachusetts was the first State in the Union to establish a State Board of Health, and that the founder of the Board was a distinguished member of this Society. It was Dr. Bowditch's writings on sanitary subjects and his personal influence upon public men which brought this Board into being; and it was he who, as its first President, gave it a successful start in its useful career. Since our last meeting, this great and noble-hearted man has passed from among us; and profound grief for his loss is the dominating sentiment of this occasion. How can we better do honor to his memory than by occupying ourselves for a time with one of the departments of medicine in which he was a pre-eminent leader?

During the twenty-two years which have elapsed since the establishment of the State Board of Health, our State has enjoyed the benefit of systematic sanitary work, the great scope and thoroughness of which is known to those who have watched its operations or read its series of Annual Reports. Investigations of the utmost practical value have been carried on, and with the aid of local Boards of Health

a vigorous warfare has been waged against the causes of disease, with a special view to the prevention and suppression of epidemics. An interesting sketch of the work of the Board was given by its President, Dr. Walcott, in the Annual Address before this Society in 1889.

Now, after twenty-two years of this excellent work, we are justified in inquiring as to the results, and even in confidently looking for such results in the statistics of mortality. Although it would not be fair to judge this work wholly by statistics, yet there is no other test which has the merit of accuracy. The trustworthiness of the Massachusetts Registration Reports is generally conceded, our State being no less distinguised among the others in this respect than in that of priority of sanitary legislation. Nowhere, therefore, in the United States are the conditions so favorable for estimating the value of public health measures as in this State of Massachusetts.

In inquiring what change has taken place in the death rate of our State, are we not justified in expecting to find a material decline? For my own part, I had hoped to discover quite a handsome reduction. Imagine, then, my surprise and disappointment at finding that the death rate of Massachusetts has remained practically unchanged. The average for the past 40 years has been 19.35 per 1,000, while for 1890 it was 19.44, a trifling increase. Dividing this period of 40 years into decades, we find the average death rates for each decade to be 18.24, 19.43, 19.81 and 19.59. Thus there was a slight increase in the death rate which reached its maximum in the third period. The average for the fourth decade was slightly less than the third, and yet was higher than either the first or second. The best that can be said is that the upward tendency was arrested about 1884, since which time there has been a slight irregular downward tendency.

But, unsatisfactory as this showing is, we must not be

hasty to conclude that nothing has been accomplished and that the movement for the prevention of disease has proved a dismal failure. Let us rather analyze the death-rate, to ascertain whether there are any special directions in which an improvement can be discovered. My own studies in this direction have proved profoundly interesting, and have resulted in the discovery that the mortality from certain diseases is decreasing while that from others is increasing, the gain and the loss so nearly balancing each other as to produce but little impression upon the general death rate.

In order not to weary you with statistics, I have prepared diagrams which show at a glance the comparative mortality from twelve principal diseases or classes of disease during the forty-one years from 1850 to 1890.

In these diagrams, the vertical lines correspond to the number of years, and each horizontal line represents one death to 10,000 of population. Each of the irregular lines, or curves, therefore, indicates the number of deaths from a specified disease, in each year, to every 10,000 of population for that year.

In the preparation of these statistics, I am indebted for much valuable aid to Dr. S. W. Abbott, Secretary of the State Board of Health.

An examination of these several curves shows that five of them have a decided downward tendency. These are

Small-Pox,
Scarlet-Fever,
Measles,
Typhoid-Fever,
Consumption.

Observing these in detail, we find that *Small-Pox* declined irregularly from 1850, recurring in epidemics about once in five years, the epidemics lasting two to three years, until 1872-73, when a great epidemic which extend-

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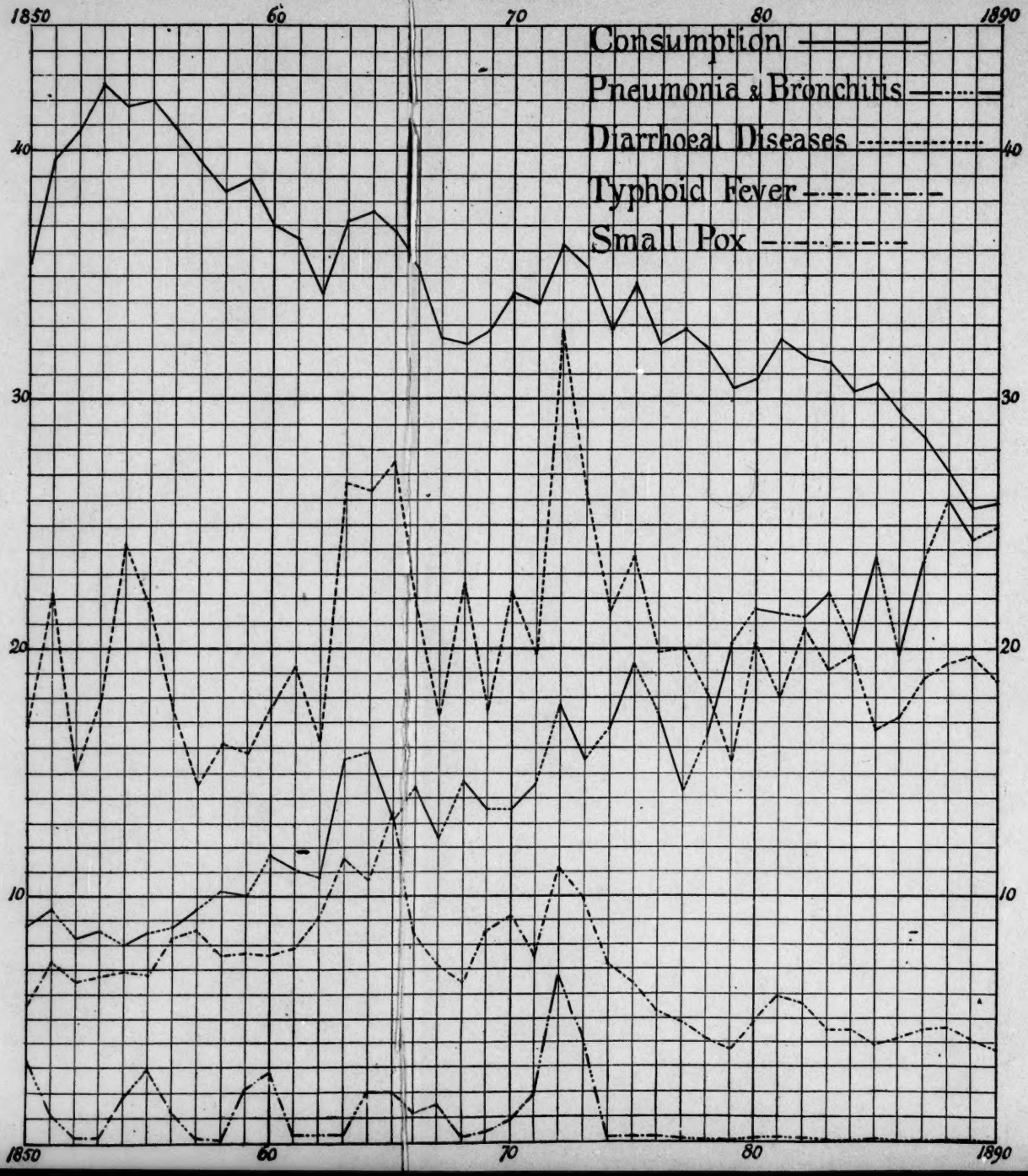
1850
60
70
80
1890
Consumption
Pneumonia & Bronchitis
Diarrhoeal Diseases
Typhoid Fever
Small Pox
40
30
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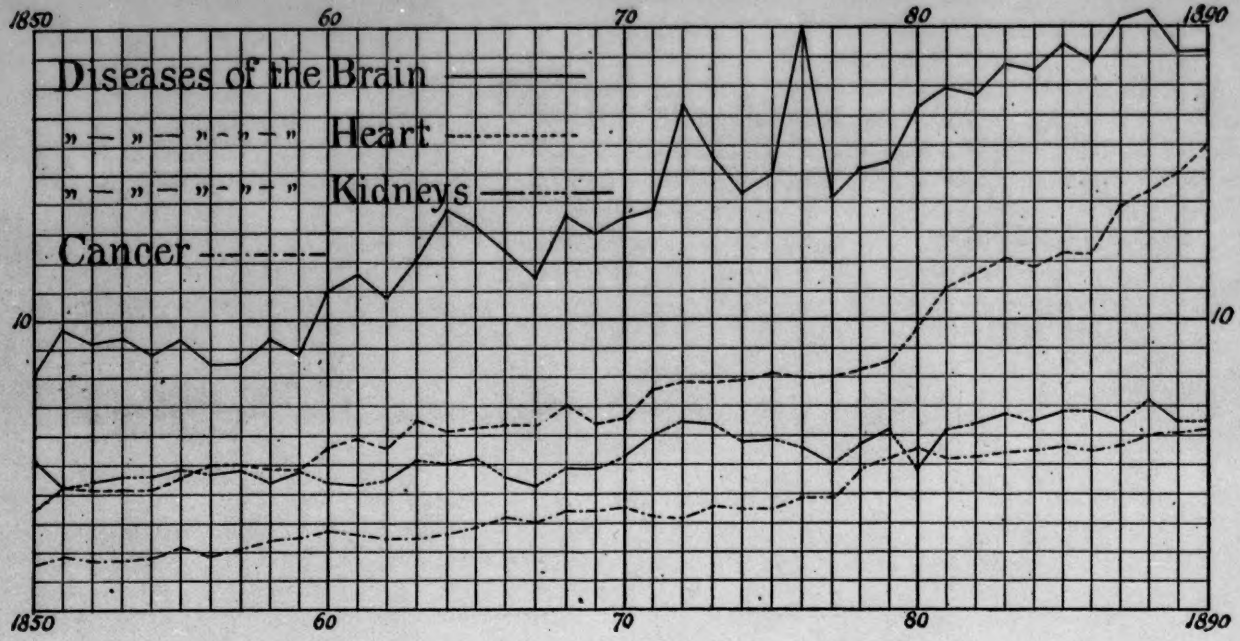
1850
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Diseases of the Brain
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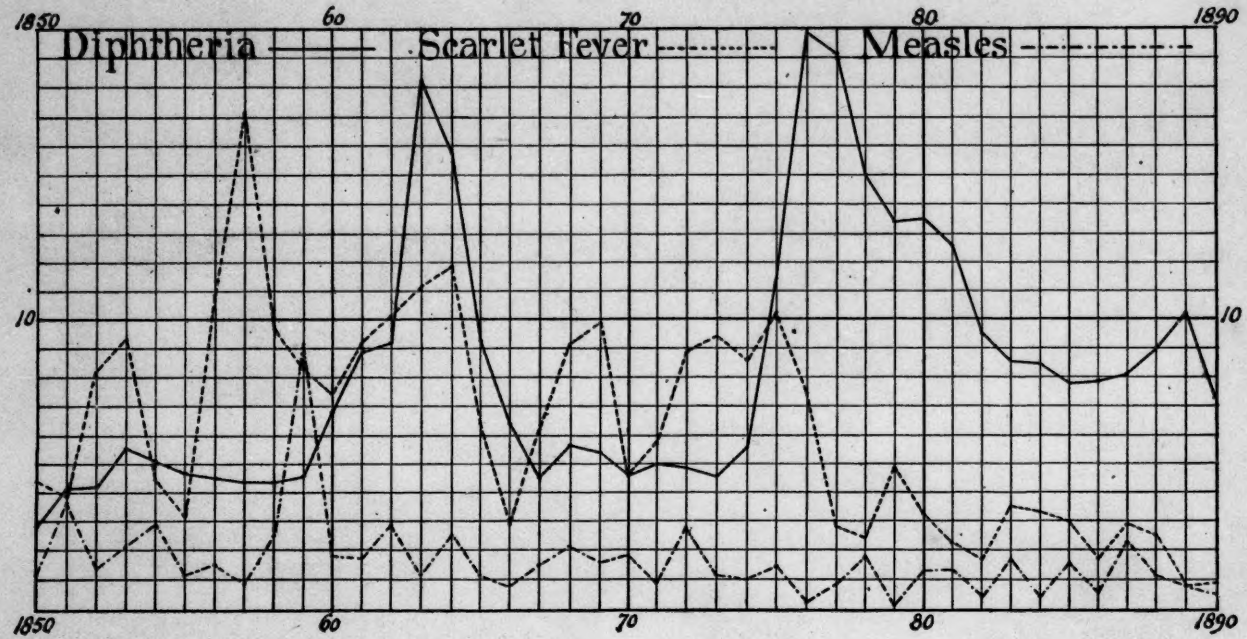
1850
60
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1890
Diphtheria
Scarlet Fever
Measles
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1890

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ed all over the country caused the heaviest mortality on record in this State, the number of deaths in 1872 amounted to 1029, and in 1873 to 668. The following year they had fallen to 26, since which time they have steadily tapered off until 1886, when not a single death occurred from this cause. In 1890 there was but one death.

Scarlet-Fever and *Measles* have both decreased in each decade since 1850, the epidemic waves showing a receding tide. For *Scarlet-Fever* there was but little difference between the average of the first and second decades; the third showed a marked decrease, and the fourth the sharpest decline of all. Measles, however, owing to the severe epidemic of 1859, made the greatest fall in the second decade, since which time the mortality has been low and declining.

Typhoid-Fever increased in the second decade, the maximum being reached in 1865, since when the fall has been decided, though undulating.

The fall in the death rate from *Consumption* is very striking, each decade showing a decrease since 1850. The decline was the most marked in the second decade, and has been comparatively steady since 1860.

The curve for *Diphtheria* and Croup shows two great epidemics, reaching their height in 1863 and 1876, the third decade having the heighest average. Since 1876 there has been a fall, well marked but not great, so that the average for the last decade, though lower than the third, is still a trifle higher than the second, and almost double that of the first.

The *Diarrhœal Diseases* exhibit a mortality greater than any of those yet mentioned, except Consumption. The list includes Cholera Infantum, to which are attributed more than half of the deaths, Dysentery, Diarrhœa, Cholera Morbus and Enteritis. The mortality from these is seen to be irregular. The highest average was reached in the third decade, which was however but little above the second.

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The fourth is lower than the second or third, but still a little higher than the first. The highest point was reached in 1872. A more favorable showing could be made by selecting Cholera Infantum and Dysentery; but the figures are liable to be so largely affected by uncertainties of diagnosis and nomenclature that it has seemed best to consider the diarrhœal diseases only as a whole.

If we now examine the curves for Bronchitis and Pneumonia, Diseases of the Brain, Heart and Kidneys, and for Cancer, we find one observation to be true of them all, namely, that they have all increased in mortality, and that each of them has increased in each decade since 1850.

The most remarkable increase is shown in the case of Bronchitis and Pneumonia, the death rate from which was more than three times as great in the last decade as in the first. This increase has been enough to slightly more than compensate for the decline in Consumption. The query, therefore, which naturally presents itself, is whether we have not here, again, to deal with a question of diagnosis rather than of fact. Very likely we have, to a certain extent; but an examination of the ages at which the deaths occurred will convince us that this is not the only explanation. Thus we find that *1st*, the increase of Bronchitis is largest during the first two years of life, and next largest after the age of fifty, these being the ages when Consumption is least fatal; and *2d*, that if we add together the total deaths from Consumption, Bronchitis and Pneumonia for the several age periods, for the two years 1861 and 1890, we find an increase of these aggregated lung-diseases under the age of five years and between the ages of forty and fifty; but a decrease between five and forty, and over fifty. The most marked decrease is between the ages of fifteen and thirty. As the gain therefore is greatest at the ages most prone to Consumption, we may safely conclude that there is an actual falling off in the mortality from this disease.

The increase in the mortality from diseases of the Brain, Heart and Kidneys, and from Cancer, is very remarkable. Diseases of the brain have increased two-fold, those of the heart three-fold and cancer nearly three-fold, while diseases of the kidneys and dropsy, taken together, have increased about 50 per cent. This means, of course, in proportion to the population. The actual increase has been twice as much, the population of the State having doubled in the forty years.

Thus we may provisionally classify diseases in two groups, those which are decreasing and those which are increasing. Let us now inquire what other features characterize these two groups.

In the first place we observe that all of the decreasing diseases except consumption, belong to the zymotic class. Even consumption it is hardly possible, at the present day, to exclude from this group, though the nosologists still retain it among the constitutional diseases. Now, these same zymotic diseases are the very ones which are most amenable to preventive measures, and against which these measures have been chiefly directed.

Small-pox has been vigorously fought by vaccination, quarantine, inspection of imported rags, isolation of cases and disinfection. The result is one of the greatest triumphs of sanitary science, for this disease, once so frightful in its ravages, is for the present practically stamped out.

Scarlet-Fever and *Measles* have been combated by isolation and disinfection, and by the protection of school children by forbidding the attendance at school of any children liable to convey the infection.

For the prevention of *Typhoid Fever* every effort has been made to ensure the purity of drinking water, the improvement of sewerage and local cleanliness. The thorough and systematic work of the State Board of Health in relation to the water supply and sewerage of the State is of

inestimable value, both present and prospective, and is worthy of our grateful recognition.

The decline in the mortality from these four diseases, small-pox, scarlet fever, measles and typhoid fever, has been so marked during the past twenty years, since the establishment of the State Board of Health and the generally increased attention to sanitary measures, that it is impossible to avoid the conclusion that these facts stand to each other in the relation of cause and effect, and that to our sanitary laws and their careful execution may be attributed the falling off of the death rate from these diseases.

That the same notable decrease is not found in the case of the diarrhœal diseases and of diphtheria and croup is disappointing, and yet it is satisfactory to find that, though the improvement is less, it is not insignificant, and that it has been continuous for periods of fourteen and eighteen years respectively. The great difficulty in the case of diphtheria is its virulent contagiousness and persistent infectiousness, facts which have been very strongly presented by Dr. S. W. Abbott, in his recent admirable paper on "Diphtheria in Massachusetts"; but which, as yet, appear to be inadequately understood by the public. The causes of the diarrhœal diseases are difficult to reach, the controllable factor of local or general filthiness being influenced powerfully by the uncontrollable factor of intense summer heat; while a third factor, namely bacteria in milk, is liable to elude the most active vigilance. But all of these problems are receiving the careful attention of the sanitary authorities, and their satisfactory solution may be hopefully expected.

The zymotic diseases as a class have diminished from 474 to each 100,000, in 1870, when the State Board of Health began its work, to 360 to each 100,000 in 1890. This is equivalent to a saving of over 2500 lives in 1890, and is a result of which the Board and every citizen may well feel proud.

How far the decrease of *Consumption* may be attributed to sanitation is a question not readily answered. The agencies likely to affect this disease have been the better ventilation of school-houses, factories and public halls, the improvement of tenement houses, the drainage of wet cellars, and the weeding out of tuberculous cows. While some good results from these agencies are to be expected, yet they are wholly insufficient, and are not likely to have caused the very marked decline which the statistics show. One important fact which must not be overlooked is the removal from the State of great numbers of consumptives to more favorable climates where, if they die, their deaths are not charged to the State of Massachusetts.

While thus we find that all of the diseases which are decreasing are those against which the efforts of the sanitary authorities have been actively directed, the converse fact is equally striking, namely, that the increasing diseases are either not amenable to public preventive measures, or have not yet been subjected to such measures. No official method of preventing diseases of the brain, heart, lungs or kidneys, or of cancer, has yet been discovered, and in the present state of science we cannot expect the Health Boards to control them in any way whatever. The increase of these diseases cannot therefore be attributed to any lack of efficiency on the part of the health officers, nor is there any just debit to offset the 2500 lives a year which we have just placed to their credit.

The second general feature which characterizes these two groups of diseases is this: that the diminishing diseases are chiefly those of early life, while the increasing diseases are those of later life.

Of the deaths from measles in 1890, nearly all were under ten years of age, and more than half under two years. From scarlet fever and diphtheria the maximum mortality was between five and ten years; and nearly all of the deaths

occurred from the former under fifteen years, and from the latter under thirty years. From the diarrhœal diseases, more than 83 per cent. occurred under five years. Typhoid fever and consumption are especially diseases of early adult life, and both attain their highest mortality between the ages of twenty and thirty. In striking contrast with these are the increasing diseases. Diseases of the heart are most fatal between the ages of fifty and eighty; brain diseases between seventy and eighty, and kidney diseases and cancer between sixty and seventy. As regards pneumonia, although the first year of life is the most fatal, yet one half of the deaths occur after the age of forty, and the most fatal period after the first year is between the ages of sixty and seventy.

At this point it is necessary to inquire what relation this excessive mortality at the later ages bears to the number of persons living at those ages. The census of 1880 shows that the population of Massachusetts embraced in that year a larger percentage of persons over sixty years of age than any other of the United States with the exception of Maine, New Hampshire, Vermont and Connecticut. It also included a smaller proportion under five years of age than any other State with five exceptions. Moreover, the population under fifteen years is decreasing, and over fifty is increasing. Yet neither of these facts will explain the decrease of mortality in early and the increase in later life; for when we compare the deaths at given ages with the number of persons living at those ages, we find a decrease at all ages below forty, and an increase at all ages above forty. The decrease is greatest between five and thirty, and the increase grows greater and greater in each ten years from forty upward. The natural effect of this condition is to increase the number of persons living to middle age, but to reduce the proportion of very old people. The effect upon the average duration of life has been to increase this average in the last forty years from 27.07 years to 34.13 years, a gain of over

seven years; a remarkable fact when taken in connection with the unchanged death rate and the increased mortality of old age. This gain, therefore, belongs wholly to early life, and shows that children have now a better chance than forty years ago of living to maturity, and of passing safely through the producing and reproductive age. The change is therefore in that direction which is, beyond all others, of material value to the Commonwealth.

It is difficult to institute any comparison between the statistics of Massachusetts and those of other portions of the United States, partly because the compilation of the vital statistics of the census of 1890 is not yet completed, and again because the superior accuracy of the Massachusetts registration gives our State an excessive death rate as compared with other States, which is more apparent than real. But when the new census is completed, we may expect results of great value, worked out under the skillful supervision of Dr. John S. Billings. One observation however may here be made, which is that the diseases which are here decreasing are those which in 1880 were in Massachusetts below the average for the United States, and those which are increasing were, in that year, well above that average; showing that these disease-tendencies are, at least in their excessive manifestation, peculiar to our own section of the country.

In order that we may have a more definite basis for comparison, let us refer briefly to the vital statistics for England and Wales. From 1850 to 1880 the death rate of Massachusetts was almost invariably lower than that of England and Wales, but since 1880 the rates have been almost identical, the death rate over there having showed a pretty steady decline since 1875, and now having crept a little below ours.

An examination of the causes of death in England and Wales shows a very similar state of things to that which

exists in Massachusetts, namely, that the zymotic diseases and consumption are decreasing, while there is a decided increase in acute diseases of the lungs and in diseases of the heart, kidneys and cancer. The chief exceptions are the following: *diphtheria*, which decreased in earlier years, while it was increasing in Massachusetts, has since 1880 been on the increase in England and Wales. The decrease in small-pox has not been so remarkable as in Massachusetts. The mortality from diseases of the brain in England and Wales shows no marked increase, but still is much higher than in Massachusetts, where the increase has been very rapid.

In regard to the actual mortality, the chief differences between Massachusetts and England and Wales are these: we have a larger proportion of deaths from diphtheria, diarrhœal diseases, fever and consumption, while England and Wales have a larger proportion from small-pox, measles, scarlet-fever, acute lung diseases, diseases of the brain, heart and kidneys, and from cancer.

For the data for these comparisons I am indebted to Longstaff's "Studies in Statistics," a book which might appropriately have been entitled "Arithmetic made Interesting." It was not till after my examination of the Massachusetts statistics that this delightful volume came into my hands, and I was much interested to find so strong a general correspondence between the disease tendencies of these two widely separated communities, a correspondence indicating the presence of similar social forces. Concerning the decrease in the zymotic diseases, Longstaff says (p. 235):

"It seems impossible to dissociate this great saving of life from the operation of the Public Health Acts, and more especially the indirect results of this as shown in the proceedings of such bodies as the Sanitary Institute, the exhibition of sanitary appliances under various auspices, and other proofs that public attention has been drawn to these matters. The fall in the death rate from fever is without

doubt the great triumph of the sanitary reformers. Typhus has been driven out from place after place by measures taken to check over-crowding and want of ventilation until it now lingers only in the lowest quarters of a few large towns. Things are not perfect yet, far from it; but they were once much worse, and that not so long ago."

"Things are not perfect yet." These words used by Mr. Longstaff concerning his own country are equally true in Massachusetts, where more than 8,000 persons died in 1890 from the zymotic diseases alone. If 8,000 lives are destroyed in a single year by preventable diseases, surely prevention has not yet done its perfect work. We must remember also that the baleful influence of the zymotic diseases cannot be measured by their mortality alone; for many who recover from them are left with weakened constitutions or with some organic affection which impairs their usefulness and shortens their lives. Such are diseases of the kidneys resulting from scarlet-fever, of the lungs from measles, and of the heart from diphtheria. The results thus far accomplished, however, are substantial and encouraging, and a sufficient vindication of our sanitary laws and the mode of their enforcement. The indications for the future are that these efforts must be no whit relaxed, but must, on the contrary, be increasingly strenuous. To relax them at any point would entail direful consequences. The contagious and infectious diseases are like fire which must be fought unceasingly until it is extinguished. Left to itself it will burn until the inflammable material is all consumed. With all that has been done, we have seen how small are the results in some very important directions. Small-pox is the only disease which can be said to be almost extinguished; and yet the smouldering spark of even a single case of small-pox is sufficient, with the least removal of the agencies which hold it in check, to flash up into the blaze of a desolating epidemic. Even in our present immunity

lurks a future danger; for the further we get away from an epidemic and a scare, the larger will be the proportion of persons unprotected by vaccination.

Our aim should be the ultimate extinction of all germ-diseases; but when this will be accomplished I do not venture to predict. The condition most favorable for such a happy result would be an isolated community holding absolutely no intercourse with the rest of the world. Here a war of extermination against all disease germs might be successfully waged, supposing such an isolated people to be possessed of the requisite intelligence or to find life sufficiently interesting to care for its preservation. But Massachusetts is not thus isolated, nor is it possible in this age that such a condition should anywhere obtain. Emigration, trade and travel cause a constant intermingling of peoples. Quarantine, to be sure, acts as a check upon the importation of disease from abroad; but evidences of the impotency of quarantine are alarmingly frequent, and interstate quarantine is impossible. Our State might be free from zymotic diseases today, and yet by tomorrow a full assortment of them might be brought within our borders. Herein lies the great obstacle to the stamping-out process; and it is therefore safe to say, if pressed for a prediction, that the epidemic diseases cannot be eradicated from Massachusetts until they are likewise eradicated from every part of the world. That such a time may come we may venture to hope. Whether or not we believe in it as a practical possibility, we should be satisfied with no lower ideal.

But if epidemics cannot be kept *out*, we may reasonably hope to keep them *in*; and here is the true principle which should guide our efforts. Every city and town should see to it that no epidemic disease is allowed to spread beyond the first case, and on no account to pass beyond its borders. This is already the aim of the Boards of Health; but in order to achieve success, these Boards must be aided by an

intelligent public, and especially must they have the active and watchful co-operation of the whole medical profession.

There is one particular direction in which, it seems to me, that we Doctors can, at this time, render material service in this cause; and that is by making a concerted effort to secure the general adoption of *disinfection by steam*. The modes of disinfection now in use after a case of infectious disease are very diverse, and seldom sufficient. If the germs do happen to get destroyed, it is apt to be at the cost of a ruinous destruction of property. Especially is there no thorough and convenient way of disinfecting mattresses, pillows and carpets. What is needed is a receptacle of sufficient size in which these may be placed and subjected to a moist heat in the form of steam under pressure. By a pressure of ten pounds, a temperature of 230° F. is obtained, a continuance of which for fifteen minutes is found to be sufficient. Dry heat requires a much longer exposure, at least two hours, and even then is not certain. Superheated steam, which is practically dry heat, has been tried and found wanting. But steam under pressure can be kept at a sufficient temperature and forced into the centre of any porous material, with the result that every germ becomes thoroughly cooked. Various forms of apparatus for this purpose are made in France, England, Germany and Holland. They have not yet come into general use in this country, though this method is employed, in some form, in most of our large hospitals. It has also been adopted, within two or three years, at the quarantine stations at New Orleans and Charleston. At New Orleans superheated steam had previously been tried on a large scale, but abandoned. The disinfecting oven made by Geneste, Herscher & Co., of Paris, is very complete, and may be taken as the type of this form of apparatus. This consists of a sheet iron cylinder, sheathed with wood to prevent radiation, with a door at each end fastened by clamps.

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"It seems impossible to dissociate this great saving of life from the operation of the Public Health Acts, and more especially the indirect results of this as shown in the proceedings of such bodies as the Sanitary Institute, the exhibition of sanitary appliances under various auspices, and other proofs that public attention has been drawn to these matters. The fall in the death rate from fever is without

doubt the great triumph of the sanitary reformers. Typhus has been driven out from place after place by measures taken to check over-crowding and want of ventilation until it now lingers only in the lowest quarters of a few large towns. Things are not perfect yet, far from it; but they were once much worse, and that not so long ago."

"Things are not perfect yet." These words used by Mr. Longstaff concerning his own country are equally true in Massachusetts, where more than 8,000 persons died in 1890 from the zymotic diseases alone. If 8,000 lives are destroyed in a single year by preventable diseases, surely prevention has not yet done its perfect work. We must remember also that the baleful influence of the zymotic diseases cannot be measured by their mortality alone; for many who recover from them are left with weakened constitutions or with some organic affection which impairs their usefulness and shortens their lives. Such are diseases of the kidneys resulting from scarlet-fever, of the lungs from measles, and of the heart from diphtheria. The results thus far accomplished, however, are substantial and encouraging, and a sufficient vindication of our sanitary laws and the mode of their enforcement. The indications for the future are that these efforts must be no whit relaxed, but must, on the contrary, be increasingly strenuous. To relax them at any point would entail direful consequences. The contagious and infectious diseases are like fire which must be fought unceasingly until it is extinguished. Left to itself it will burn until the inflammable material is all consumed. With all that has been done, we have seen how small are the results in some very important directions. Small-pox is the only disease which can be said to be almost extinguished; and yet the smouldering spark of even a single case of small-pox is sufficient, with the least removal of the agencies which hold it in check, to flash up into the blaze of a desolating epidemic. Even in our present immunity

lurks a future danger; for the further we get away from an epidemic and a scare, the larger will be the proportion of persons unprotected by vaccination.

Our aim should be the ultimate extinction of all germ-diseases; but when this will be accomplished I do not venture to predict. The condition most favorable for such a happy result would be an isolated community holding absolutely no intercourse with the rest of the world. Here a war of extermination against all disease germs might be successfully waged, supposing such an isolated people to be possessed of the requisite intelligence or to find life sufficiently interesting to care for its preservation. But Massachusetts is not thus isolated, nor is it possible in this age that such a condition should anywhere obtain. Emigration, trade and travel cause a constant intermingling of peoples. Quarantine, to be sure, acts as a check upon the importation of disease from abroad; but evidences of the impotency of quarantine are alarmingly frequent, and interstate quarantine is impossible. Our State might be free from zymotic diseases today, and yet by tomorrow a full assortment of them might be brought within our borders. Herein lies the great obstacle to the stamping-out process; and it is therefore safe to say, if pressed for a prediction, that the epidemic diseases cannot be eradicated from Massachusetts until they are likewise eradicated from every part of the world. That such a time may come we may venture to hope. Whether or not we believe in it as a practical possibility, we should be satisfied with no lower ideal.

But if epidemics cannot be kept *out*, we may reasonably hope to keep them *in*; and here is the true principle which should guide our efforts. Every city and town should see to it that no epidemic disease is allowed to spread beyond the first case, and on no account to pass beyond its borders. This is already the aim of the Boards of Health; but in order to achieve success, these Boards must be aided by an

intelligent public, and especially must they have the active and watchful co-operation of the whole medical profession.

There is one particular direction in which, it seems to me, that we Doctors can, at this time, render material service in this cause; and that is by making a concerted effort to secure the general adoption of *disinfection by steam*. The modes of disinfection now in use after a case of infectious disease are very diverse, and seldom sufficient. If the germs do happen to get destroyed, it is apt to be at the cost of a ruinous destruction of property. Especially is there no thorough and convenient way of disinfecting mattresses, pillows and carpets. What is needed is a receptacle of sufficient size in which these may be placed and subjected to a moist heat in the form of steam under pressure. By a pressure of ten pounds, a temperature of 230° F. is obtained, a continuance of which for fifteen minutes is found to be sufficient. Dry heat requires a much longer exposure, at least two hours, and even then is not certain. Superheated steam, which is practically dry heat, has been tried and found wanting. But steam under pressure can be kept at a sufficient temperature and forced into the centre of any porous material, with the result that every germ becomes thoroughly cooked. Various forms of apparatus for this purpose are made in France, England, Germany and Holland. They have not yet come into general use in this country, though this method is employed, in some form, in most of our large hospitals. It has also been adopted, within two or three years, at the quarantine stations at New Orleans and Charleston. At New Orleans superheated steam had previously been tried on a large scale, but abandoned. The disinfecting oven made by Geneste, Herscher & Co., of Paris, is very complete, and may be taken as the type of this form of apparatus. This consists of a sheet iron cylinder, sheathed with wood to prevent radiation, with a door at each end fastened by clamps.

Within the cylinder, above and below, are coils of steam pipe for the preliminary heating of the chamber, to prevent condensation. Another pipe pierced with small holes traverses the side of the cylinder and admits the steam to its interior. The articles to be disinfected are placed in a carriage or rack which runs upon a track into the oven. After the doors are fastened a dry heat is first obtained by admitting steam to the coils of pipe. Steam is then admitted directly into the cylinder and the air allowed to escape. Then the outlet is closed and the pressure of steam kept up for about five minutes. The steam is then permitted to escape, and admitted a second time. By this intermittent action, the most complete penetration of the articles under treatment is secured. Even the heart of a mattress becomes as hot as its surface. These ovens are made both stationary and portable. The stationary form is built into a wall in such a way that the opposite ends open from separated rooms, whereby any mixing of infected and disinfected articles is avoided. These ovens are from 7 feet to 7½ feet in length, by 3 feet 8 inches to 4 feet 4 inches in diameter. The portable apparatus is smaller, has a door only at one end, and with its upright boiler strongly resembles a steam fire engine. This weighs 2400 kilogrammes (5291 lbs.), is drawn by a pair of horses, and costs in Paris $1,340. The stationary form costs $980 to $1282, according to size. These are extensively adopted in France, and are under municipal control, being placed free of cost at the service of the public.

The steam disinfector of Washington Lyon of London is similar in principle, but is made with a double casing instead of the steam coils. It is also oval in form and is only made stationary. I see no reason why disinfectors of this type should not be made in our own country, and cheaper than they could be imported. If every town in Massachusetts, or at least the larger ones, owned such a disin-

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fector, the arrest of epidemics would become a much easier matter then it is at present. If the portable form were adopted, it could be sent to neighboring towns or villages. If the stationary form, the articles to be disinfected would be packed in bundles or bags and conveyed in a special wagon to the disinfecting station.

Let us all make a business of calling the attention of the authorities and the public to this matter.

The reduction of the mortality from *consumption* is one of the greatest of sanitary needs; for this is, in our climate, the most destructive of all diseases. Great as has been the apparent decline in the last forty years, it still holds its place at the head of the list, having caused in 1890 5791 deaths. Moreover, its mortality being greatest in the most active period of life—that of young manhood and womanhood—the loss to the community is peculiarly heavy. In Massachusetts the mortality from this disease is greater in the eastern than in the western counties, and is greater in the cities than in the country. Our Irish population suffer more severely than any other class, and the large proportion of this nationality in our population is one cause of our high death rate from consumption.

The discovery of the tubercle bacillus adds consumption to the list of germ diseases, and indicates modes of prevention from which we are justified in expecting great results. Hitherto, our efforts have been directed to the overcoming of hereditary tendencies and the improvement of the environment; now it appears that there is one element in the environment more dangerous than all others, and this is the venomous little bacillus. That consumption is both contagious and infectious can no longer be doubted. Instances of evident contagion have come under my own observation; and doubtless many members of this Society could report similar cases. How else can we account for the phenomenon which is frequently presented to us of several brothers

and sisters in a family dropping off, one by one, from this disease, with no hereditary tendency and no unsanitary surroundings? And what can we say of those cases where a healthy young person suddenly breaks down with consumption shortly after nursing or paying a loving visit to a consumptive friend? Hereditary predisposition exists in not over 30 per cent. of all cases, and this is probably an excessive estimate. Of the deaths in Massachusetts therefore, in 1890, 70 per cent., or 4,053, had no consumptive antecedents. Without contagion, this is a puzzling fact, but granting contagion the mystery is removed.

That the bacilli which swarm in phthisical sputa are capable of conveying the disease to a healthy person, whether in the fresh or dry state, is now so positively determined that it becomes the duty of all medical men to explain the matter to their patients and their patients' families, and to insist upon such precautions as tend to prevent the spread of the disease. These precautions may be summed up in a few simple rules such as these:—

1. Let all sputa be carefully collected and destroyed by fire.

2. Let sputa never be deposited on handkerchiefs, carpets, floors, or any other place where it may dry and become mingled with the atmosphere.

3. Never drink from the same glass with a consumptive.

4. Never kiss a consumptive upon the mouth.

These rules are equally applicable to pneumonia and perhaps also to bronchitis. It will therefore be best to call them, not rules for consumptives, but for *all persons who cough and expectorate*. This will save the patient from the shock of a positive and perhaps too hasty diagnosis.

The investigations concerning tuberculosis in cattle show how carefully we must watch the milk supply of our patients, and especially since Dr. Ernst has demonstrated that a cow tuberculous in any part may yield tuberculous

milk. This fact also emphasizes the importance of forbidding a consumptive mother to nurse her offspring.

Boards of Health have already begun to publish rules such as the foregoing; but in order that they should be so generally and intelligently followed as to produce any positive results, it is necessary that physicians should persistently teach the public of their necessity.

Having thus hopefully and even confidently placed consumption among the preventible diseases, why are not the acute lung affections entitled to the same distinction? We know that they have their specific germs, and we believe in their communicability; and though our knowledge of the natural history of these germs is as yet very limited, their very existence opens up possibilities of future prevention, and should lead us to add them, at least experimentally, to the preventible class.

Having now broadened out the boundaries of the preventible diseases to extreme and perhaps you will say unwarrantable limits, let us see for what portion of the mortality these are accountable.

For the five years ending in 1890 the zymotic diseases caused 18 per cent. of all the deaths. Consumption and the other tubercular affections caused very nearly the same proportion, namely 17 per cent., while pneumonia and bronchitis were responsible for 11 per cent. These amount in the aggregate to 46 per cent., or not quite half of the total deaths. Of what, then, is the other half of the death rate composed? For one thing, it includes old age, to which are attributed 4½ per cent. of all deaths. The rate to the population has remained practically unchanged in forty years, being from eight to ten to 10,000. But this is not a disease. On the contary, a death from old age, since it implies living to old age, is the greatest triumph of human vitality; and the *ultima thule* of preventive medicine is to render old age common, hereditary and even con-

tagious. We may therefore exclude old age from the list of non-preventible diseases, and the same may be said of violence, which causes 4 per cent. of all the deaths.

This will leave as a remainder about 45 per cent. of all deaths. More than half of this number is made up of diseases of the brain, heart, kidneys, and of cancer, and the balance comprises the diseases of the digestive organs, including the liver, of the organs of generation and locomotion, of the developmental diseases, and disorders of nutrition. It is among these, or a portion of them, that the great increase in mortality is taking place. How to arrest this mortality is one of the most important medical problems of the day, and one which it behooves the medical profession to set itself resolutely to solving.

We have seen that these increasing diseases are largely those of the latter part of life, or at ages above forty. In some respects the loss to the community is somewhat less of persons of this age than of the same number of persons between twenty and forty, which is the age of production and of re-production. These older men and women have reared their families and have passed the age of greatest strength and activity; but they are possessed of something which we cannot spare, namely, the experience and wisdom which belong to ripe maturity. Many and many a brilliant leader of men in politics, literature or the professions, is cut down in what should be the prime of life, between 40 and 60, when he ought to have lived to 70 or 80 to give the world the benefit of those well seasoned powers which had but just attained their full development.

These diseases of later life are largely of the degenerative type, the disintegration of tissues in one organ or another. Our great Poet Doctor has sung to us of chaises which "break down but never wear out," and therein has typified the human vehicle, which, like a chaise, has "always *somewhere* a weakest spot." How shall these weak spots be

made strong? How can the human chaise be made to run "a hundred years to a day," or even keep in good repair for three-score years and ten? How, in short, can the long life and perennial youth of the writer of the "One Hoss Shay" be made less exceptional among men?

Before attempting to answer these questions, it is necessary to inquire what are the causes which contribute to the increase in the diseases of later life. These, it seems to me, can be grouped under two general heads, of which the first is that *this is the natural tendency of an advancing, but still imperfect civilization.*

In comparing the effects of the diseases of men with those of the lower animals, we find a marked difference. Animals, like men, are not born equally vigorous, and in the struggle for food and against enemies the weaker are soon weeded out. These also more readily fall a prey to diseases, which are chiefly of the zymotic type, and since they receive no care from their kind, they cannot obtain food, and necessarily die. It is therefore the strong and healthy only who reach maturity and become the parents of the next generation. This is "natural selection," or "the survival of the fittest." Moreover, the lower animals, being guided by instinct, naturally tend to adapt themselves to their environment. Without knowing why, they select such food as is most suitable for them, and adopt such habits as are best for their physical well-being.

But with man, and especially civilized man, the circumstances are changed. The law of the survival of the fittest is still in force, but is modified in its action by the fact that man is governed by *will* and not by instinct, and also possesses intellectual and moral faculties whereby the selfish and cruel propensities of the brutes are, or may be, overcome. By these qualities the physical character of the race is affected in several ways. The delicate children receive the most tender care and are often enabled to grow to

maturity and procreate children of their own. Diseased persons are cared for in homes or hospitals and not allowed to starve, as the brutes are; but those who have recovered from disease are often, if not usually, left with some impairment of structure or function which is then liable to be transmitted to the next generation. Again, as it is a matter of choice with men "what they shall eat, what they shall drink and wherewithal they shall be clothed," they may and frequently do choose such a mode of life as is incompatible with integrity of structure, however perfect originally. Man's freedom of action leads him more naturally to self-indulgence than to self-restraint, and self-indulgence leads inevitably to physical degeneracy. Savage man very nearly resembles the brutes, as regards natural selection, but the tendency of civilization is not to the survival of the fittest physically, but to the preservation of impaired lives, the impairment of healthy lives, the hereditary transmission of weaknesses of structure, and consequently to the development of a race in which perfect health is almost unknown, and tendencies to disease are an universal heritage. With these tendencies we all have to contend. They are the structural weaknesses with which we are born, and which, though they may not show themselves for years, are ever ready to yield to some special strain which a perfect structure would successfully resist. To these are added mental and moral inherited defects, weakness of will or overmastering desires, which cannot fail to influence the physical development.

The fundamental reason for this state of society seems to be that man is still in a transition state. He is neither a brute nor has he yet become a perfect man. The brute is well equipped for life with an unerring instinct. Man has endowments which are capable of rendering him far better service, namely, a will, an intellect and a conscience. If this machinery were perfect (and in the ideal man it must

be perfect), man would emancipate himself from all the ills which now enslave him, and disease would vanish from the earth. But thus far, a perfect co-ordination between the will, the reasoning power and the conscience is seldom found; and the age when it shall become so constant as to acquire the force of an hereditary racial characteristic must be regarded as extremely remote.

The conclusion is here forced upon us that a high physical condition of the race is impossible without a high moral condition, with the self-restraint which this implies; and hence that even for the physical uplifting of the race, science requires the aid of religion.

The second general cause which appears to contribute to the increase of the diseases of mature or advancing age is *the rapid growth of cities*. It is in cities that the degenerative tendencies of civilization are strongest. The environment is more artificial, and therefore the struggle for existence is more desperate than under the more natural conditions of rural life. To the conditions which exist in the worst part of a great city the term "necessarily fatal environment" has been not inaptly applied. In London, a native of the city, of the third generation, among the lowest classes, is practically unknown. If one is occasionally discovered, he is found to be a wretched creature, stunted in body and mind, though probably the descendant of vigorous grand-parents who came from the rural districts to seek their fortunes in the great city. This does not apply, however, to those city families whose means enable them to live in comfort and to spend a portion of the year in the country; and yet there are certain influences which affect all classes. The endless excitement of city life, the furious competition, the desperate struggle which all are making, some for wealth or position, and others for the bare necessities of life —these are fruitful sources of disease which affect both rich and poor.

Associated with a life of great mental excitement, is a general insufficiency of muscular exercise. This leads to a general prevalence of dyspepsia and lithæmia, which we know to be the under-lying causes of many organic diseases. The excessive use of alcoholic stimulants also, which is most common in cities, is one of the most fruitful causes of disease. In London it was estimated by a committee of the Harveian Society that alcohol is responsible, directly or indirectly, for 14 per cent. of all deaths.

In Massachusetts we must lay our plans with special reference to the city environment, for our State is approaching the condition of a mere group of cities. By the census of 1890 it has 70 per cent. of urban population, being a larger proportion than any other State in the Union except Rhode Island. Though our State is one of the smallest, being 44th in respect of area, it is the seventh in population and the second in density. The increase of population during the last decade has been greater than that of any State east of the Mississippi, with four exceptions. Moreover, this increase has almost all been in the cities, and some of the smaller towns are actually dwindling.

A third cause which may contribute to the increase in the diseases of later life is the influence of the late war. A great number of our most vigorous young men were killed or died in the service, and of the survivors a large proportion were shattered in health, while of those who did not enlist, many were prevented from doing so by physical disability. Our veterans are now mostly between the ages of forty-five and sixty-five, and it is evident that the average vigor of men at these ages must be less than it would have been but for the destructive effects of the war upon the young men of thirty years ago. The death-rate for veterans is, according to Dr. Billings, slightly higher than the average for men of corresponding age, while the health of living veterans is below the average standard. But just how far

this cause may affect the death-rate, I am unable to determine. A comparison of the male and female mortality has given only negative results. The death-rate for males was higher than for females in 1892; but so it was also in 1860, and the ratio between them for these two years is almost exactly the same. It was, in 1860, for males 19.2, and for females 18.2; while in 1890 it was for males 20, and for females 18.9. An examination of the comparative mortality from diseases of the brain, heart and kidneys in the two sexes, shows that while these are all somewhat more fatal among men than women, the ratio between the sexes was very nearly the same in 1890 as in 1860.[1]

These observations upon the causes of the increasing diseases are intended as suggestions only, and not as a complete enumeration of those causes. The subject is one which needs further investigation, and I commend it to this Society as one of the most serious and urgent of medical problems. Among the causes mentioned there are a few which stand out conspicuously, and seem to demand our especial attention. These are:

1. The general prevalence of digestive disturbances, due in part to a diet generally too rich in albuminoids and in part to a weakness of digestion caused by lack of exercise and mental strain. From these result lithæmia and disorders of the liver, with Bright's disease as one of the remote effects, while they constitute an important factor in the causation of diseases of the heart and brain.

2. A lack of general vigor due to insufficient exercise, resulting from sedentary occupations, cheap modes of con-

[1] The number of deaths from *unknown* causes is, through increased accuracy of registration, decreasing year by year, and this of course increases the number from *known* causes. The deaths from unknown causes in 1871 were 1290, and in 1890—515. The difference between these figures is 775, and allowing for increase of population would be 946, and if this number of deaths had been correctly returned in 1871, we might now find a less marked increase in some of the diseases. But the increase in diseases of the brain, heart, kidneys and cancer alone is four times this amount, and therefore the increase cannot be accounted for by increased accuracy of the returns.

veyance, and a climate which, during half the year, makes out-door exercise unattractive.

3. The excitement and anxiety which pervade all occupations at the present day, when men must wear themselves out in trying to keep pace with the mad rush of this age of steam, electricity and desperate competition.

4. The intemperate use of alcoholic stimulants, than which no other cause of disease is so potent and destructive. This is an old enemy; and yet one whose assaults are ever new.

In applying preventive measures of these diseases, it is evident that the campaign must be largely educational. Frugal living, self-restraint and tranquillity of mind cannot be enforced by act of legislature, while even the legal suppression of intemperance has not yet been accomplished. The work must chiefly be done by medical men in their daily intercourse with their patients. Anticipating the dangers with which they are threatened, and helping each to so order the course of his life as to pass through these dangers unscathed, constitutes the highest and the most difficult branch of preventive medicine. Though a branch which we all are practising, it is capable of broader development and demands more persistent application.

There are, however, certain ways in which much benefit may be reaped from measures of a public character.

Two of these relate to the public schools. One consists in an increased attention to *instruction in hygiene*, and the other to the general introduction into the schools of *physical training*, and in giving this a conspicuous place in the curriculum. The absence of such training has, in the past, been the greatest defect in our school system. That this defect is already being remedied in Boston and elsewhere is a most hopeful sign; and we, as physicians and humanitarians, can render the public inestimable service by using our influence to have such instruction introduced into the

schools of every city and town of the State. This should be a systematic course of gymnastic drill, extending through every grade of school, from the lowest to the highest, preference being given to the Swedish system, or something of like nature; and should be under the direction of specially trained instructors. Facilities for the training of such teachers already exist in Boston, and it would take but very few years to built up such a system of physical training that the graduates of our schools would be possessed of a sound bodily development which would give them a better chance for a long and useful life than thay now have, while this would in no way hinder, but, on the contrary, would greatly help, their intellectual development.

As a result of this inquiry into the practical effects of sanitation in the State of Massachusetts, we have found that these effects are not only tangible but brilliant, and constitute veritable triumphs of preventive medicine. But, on the other hand, we have found that with these triumphs we must not rest satisfied; for, while the hostile army of disease has been weakened in one part, it has gathered strength in another, and our partial victory is offset by severe reverses. The zymotic diseases, against which our sanitary army now chiefly directs its attack, cause but a paltry 18 per cent. of all deaths. In twenty years they have suffered a reduction of 30 per cent.; and supposing it were possible to keep up this rate of decrease by arithmetical progression, they would, in fifty years more, be reduced to zero. But, even if this extraordinary thing should happen, and the present increase of the local diseases should continued unchecked, the year 1940 would find us with a still undiminished death-rate.

We cannot longer, therefore, confine our efforts to the suppression of this small minority of diseases, but must plan a new campaign against the greater foe. Here new and

even greater difficulties confront us, for we have to contend with causes remote, complex and intangible; but to seek out and attack these causes is a duty which we now see to be imperative, and the forces of preventive medicine must be brought to bear upon them with new weapons and new modes of warfare. The Boards of Health cannot do this alone, but the whole medical profession must be the attacking army. May we all do good and valiant service against these treacherous foes which are sapping the vitality of our race and retarding the evolution of the perfected type of manhood.

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ARTICLE XXIII.

AN OUTBREAK OF TRICHINOSIS IN COLRAIN.

By FRANK H. DREW, M.D.
OF SHELBURNE FALLS.

READ JUNE 8, 1892.

AN OUTBREAK OF TRICHINOSIS IN COLRAIN.

DURING the latter part of January and February of this year, there occurred in the hill-town of Colrain, Franklin County, an outbreak of trichinosis, which, so far as I know, exceeded, in the total number of cases and the number of deaths, any previously recorded outbreak of this disease at one time and place in the New England States. Colrain has several cotton manufacturing villages within its limits, and the one where this epidemic occurred is called Willis Place and consists of a cotton mill employing about one hundred hands, a long brick block containing nineteen tenements in which all the operatives dwell, and two or three isolated houses occupied by the superintendent and the few Americans employed about the mill.

The inhabitants of the block are all foreigners,—French Canadians, Austrians and Germans from Bavaria and Würtemberg, which latter have to a large extent replaced, during the last few years, the French Canadians who formerly furnished most of the workers in the mill. The population is mainly young, there being few old people; and frequently the whole family works in the mill. Most of these Austrians and Germans have been in this country but a short time and have learned very little English. I used the German language in communicating with them, but their dialects are nearly unintelligible, and the early history of the cases was therefore not well understood in the beginning of my attendance. Perhaps, if an interpreter had been employed an earlier diagnosis might have been reached. This outbreak occurred toward the close of the

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influenza epidemic and the first physician who was called to the cases mistook them for cases of influenza, although he was much puzzled by some of the symptoms. He soon fell a victim to influenza himself and was unable to observe the further course of the cases. It was for this reason, therefore, that in many of the cases of moderate severity no physician at all was employed, and some of the severest cases were not attended by a physician until the disease was well advanced, as they thought their malady was the prevailing grip and therefore not of a serious nature. My experience with the disease began on February 8, when I saw two cases in the same family. On February 12, I met another case also in the same family. On February 14, I was called to two other families, in one of which there were three cases and in the other a single case. These seven cases were all that I attended, and it was not till several days later that I became aware of the fact that there were or had been many cases of a similar nature among the population of the block. I will relate briefly the history of the cases which came under my observation.

Case I. Frederick H., age 21, single, native of Bavaria. Had been sick ten days; complained of loss of appetite and general weakness, and some stiffness about the legs and ankles, which had been swollen slightly, but the swelling had then disappeared; his face and eyelids had been swollen a few days previously, but this had also disappeared; did not sleep well at night; bowels moved once every day. No pain or tenderness anywhere. Pulse 100, temperature 103°. He remained in bed about a week, with a temperature ranging from 101° to 103°, which gradually became normal, and there was no increase in the severity of the other symptoms. In this case there were no gastro-intestinal symptoms at any time, and the only characteristic signs of trichinosis were the early œdema of the face and eyelids, and the very slight stiffness of the legs. The temperature was higher

than in some of the other cases which were much more severe in the muscular symptoms, and generally the amount of fever seems to be no guide to the gravity of the disease, as a mild case may have a temperature of 103° for several days, while in a severe case which is to end fatally the thermometer may never register above 101°.

Case II. Henry H., age 19, brother of the preceding, taken sick about the same time. Had had œdema of face and eyelids a few days previously, which had disappeared. Some stiffness of arms and legs which had been swollen, some pain on motion, dorsal decubitus and inability to sit up or turn over in bed; occasionally slight pains in abdomen, bowels constipated; respiration 30 per minute, pulse 90 and temperature 101°; sweat considerably; appetite lost, and some difficulty in swallowing. The muscular symptoms increased in severity during the progress of the disease; dyspnœa, difficult deglutition and slowness of speech becoming more pronounced, and the feet and legs very œdematous, but there was not very much pain or tenderness in the muscles. He had considerable pain and tenderness in the abdomen, and always felt better after his bowels had been moved by cathartics. This was one of the severest cases which recovered, and it was about six weeks from the beginning of his illness before he was able to sit up. He made a rapid convalescence, however, and is now quite well.

The temperature in this case never rose above 102° and frequently was only 100° during the period of greatest severity. Insomnia was quite troublesome.

These two cases had been diagnosticated as "grip" a few days previously, which saved me from embarrassment, as I was not asked to give my diagnosis; but I thought they resembled rheumatism more than any other disease.

Case III. The father of the two preceding cases. Was not seen till my second visit to them on Feb. 12. He was a very voluble talker, but his Bavarian dialect was

nearly unintelligible and I could only make out that he suffered from pain in the bowels, diarrhœa, and pain in the legs, which were not œdematous at that time. As I could not understand him well enough to elicit the history of the trouble, it did not strike me at the time that his disease was the same as that from which his sons were suffering. His pulse rate and temperature were normal and continued so during all the time he was sick. His appetite was good throughout and he persisted in being up and walking around. His diarrhœa continued for three or four weeks and he had a good deal of pain in the abdomen. His feet and legs became œdematous, and he complained of stiffness and pain in the muscles. He also had had œdema of face and eyelids in the beginning of the attack.

At first I considered this case as one of intestinal derangement. After I had made the diagnosis of trichinosis, I learned that three other members of this family, two girls and a boy, had been ill with the same symptoms and at the same time, from one week in the mildest case to three weeks in the severest.

Case IV. Mrs. E., age 28, native of Austria, visited first on February 14, six days after seeing the first case, and it was the first intimation that I had that there were other cases in the block similar to those already described. Mrs. E. had been sick three weeks, and her disease had in the early stage, like that of the first two cases, been diagnosticated "grip." She had rather severe gastro-intestinal symptoms, vomiting and diarrhœa, abdomen bloated and painful on pressure; legs and arms swollen; and stiffness and soreness of the muscles all over the body; dyspnœa considerable; perspiration constant; pulse 120; temperature 103.5°; insomnia very distressing; mind clear. After a day or two the vomiting ceased and the diarrhœa became less severe, but continued to the end.

The other symptoms grew worse daily, the œdema increasing till the legs and thighs were enormously enlarged and of a board-like induration, and the muscular pains became so excruciating that large doses of morphine were necessary to afford any relief. The muscular stiffness was so great that she was unable to move any portion of the body but the arms, and those with difficulty. Dyspnœa increased till the respiration rate was sixty per minute, and deglutition became more and more difficult till fluids were regurgitated through the nose. There was also stiffness of the muscles of mastication and difficulty in opening the mouth. The pulse varied from 120 to 130 per minute and the temperature from 103° to 104° till the day of her death, when she went into a state of collapse and the temperature fell. The urine was examined with following result:

Reaction strongly acid, color very dark. Sp. gr. 1040. Albumen 1%. Large amount of sediment, consisting of urates and what seemed under the microscope fat globules, and granular detritus. No casts were found.

Her death occurred on February 23, after an illness of about four weeks.

The next three cases were seen for the first time on the same date as the last one, and were all in one family, and showed the three grades of severity—mild, moderate and fatal.

The youngest, John R., complained only of languor and weakness, and some stiffness. Was able to be up and around the house and recovered in about three weeks.

E. R., his brother, was more severely affected, although not confined to the bed at any time. His afternoon temperature was usually 102° and at night he sometimes had "phantasieen," as he termed it. His legs became œdematous and he suffered considerably from pain in the muscles, particularly those of the chest. He also recovered after three or four weeks' illness.

Mrs. R., age 28, wife of E. R., had been ill about two weeks as had her husband and brother, but they had all continued to work in the mill till within two or three days of my seeing them. She was confined to the bed with symptoms similar to those of the others. Insomnia was a prominent symptom with her as well as with her husband. Considerable œdema of lower limbs and pain and tenderness in the muscles on motion. Temperature 101°, pulse 100.

This woman was about six months pregnant with her first child, and informed me on February 19 that she no longer felt any fœtal movements and feared the child was dead. In the latter part of February Mrs. R. passed from my care into that of another physician, and finally died on March 17, having been ill about six weeks.

After seeing these last four cases on February 14, I began to realize that there must be an epidemic of some disease, but it was not till February 20, when I met the superintendent of the mill going his rounds among the sick, that I learned there were many other cases of a similar nature in the block, one of which, a Canadian Frenchman, Charles B., had died that day, after an illness of three weeks, his disease having been diagnosticated "typhoid fever." This was the first fatal case, Mrs. E. and Mrs. R. being the next two victims, and B.'s wife, who was taken ill soon after her husband, was the fourth and last fatal case. Mrs. B. lived till March 22, about seven weeks from the onset of the symptoms.

I obtained some pieces of muscular tissue from the body of Mrs. B., and trichinæ were found to be very numerous in them all. Four weeks previously, when Mrs. E. died, I had just made the diagnosis and endeavored to get some muscular tissue from her, but the husband's permission could not be gained.

Another French Canadian woman, Mrs. R., age 44, was the first person in the block to be taken ill with the symp-

toms of trichinosis, and the last to recover therefrom. She was not very strong when attacked by the disease and was more prostrated than any of the other cases which recovered; she had a persistent diarrhœa for twelve weeks, but is now gaining.

These are all the cases, I believe, which were seen by a physician at some stage of the disease. For information in regard to the other cases I am indebted to the superintendent of the mill, Mr. A. H. W., who observed them closely, and made frequent visits to them while confined to the house.

Mr. W. states that there were twelve others who were ill enough to be absent from work in the mill, for from one to three weeks in various cases. Of these, four were in one family, three each in two families, and one each in two others, all of whom had œdema of face and eyelids, weakness, pains, and more or less gastro-intestinal symptoms.

There were at least fourteen others who had œdema of face and eyelids and did "not feel well," but kept at work or lost but two or three days.

The duration of the disease from the time of the ingestion of the trichinæ must be reckoned as longer than would appear from the mill records, for they all, even the severe cases, worked till œdema of the face and eyelids appeared, which is said to occur on the eighth day, and I think the gastro-intestinal symptoms must have been very light in most of the cases.

Besides these thirty-six cases enumerated, there were undoubtedly many other mild cases among the children and others who do not work in the mill, as Mr. W. tells me many of them had œdema of the eyelids and face, and this is such a noteworthy and characteristic symptom of trichinosis, that in the presence of an epidemic like this it may be considered almost pathognomonic.

In addition to the cases in the block a few mild ones were reported in a village a mile distant, so that I should estimate that at least fifty persons were more or less affected with the symptoms of trichinosis during this epidemic.

As soon as a correct diagnosis was reached, efforts were made to trace the source of the diseased pork, but it was so long after the disease broke out that none of it could be discovered. Not much help or coöperation can be obtained from butchers in this respect, for they seem to feel that blame will attach to themselves and that their trade will be lessened if the facts are known—which seems to be justified in the present instance, as it has been nearly impossible to sell any form of pork or sausage to the inhabitants of the block since the epidemic. From the inquiries made it seems most probable that the trichinæ ingested were contained in bologna sausage. It is admitted by all that they used this particular form of sausage, and large amounts were consumed in the families where the fatal cases occurred. It is eaten just as it comes from the manufacturer, at whose hands it does not receive much cooking, as this impairs the flavor; and it was a favorite dish with the three women who died, as they worked in the mill and had little time for cooking. The husband of Mrs. E. never ate it, however, and, although he ate pork in other forms, never showed any symptoms of trichinosis. Mr. R. states that before they were taken sick they had some bologna sausage which he thought tasted badly and therefore did not eat much of it, but his wife liked it and ate a large quantity with a fatal result. Mrs. R. says that she ate some sausage which did not taste well and made her sick. These sausages, which are very cheap, were obtained from the local butchers who get them from Chicago.

As Secretary of Agriculture Rusk has established an official laboratory in Chicago, for the examination of pork intended for export, a larger proportion of trichinous meat

will be sold in the American market, and the disease will be likely to prevail to a greater extent than heretofore. What becomes of the pork condemned as unfit to be exported? Is it worked up into these cheap sausages which were the probable cause of this epidemic?

A. Seibert, of New York, states that investigations show that from 5 to 16 per cent. of American hogs contain trichinæ, while in Germany only 1 out of 2000 contains them. The chances of infection are therefore far greater in this country than in Germany, although the disease has been of more frequent occurrence there from the fact that the Germans are much more in the habit of eating pork and sausages in a raw or under-done condition.

Here was an epidemic of more than fifty cases with four deaths, witnessed by three physicians, yet it was not until the second death and three or four weeks from its commencement that a correct diagnosis was reached; and it is possible that if there had been no fatal cases the diagnosis of trichinosis might never have been made, and this outbreak might have passed unrecognized and unrecorded. This suggests the importance of directing the attention of physicians to the disease, and the necessity for them to make themselves familiar with its symptoms and course, and its differential diagnosis from those diseases for which it is most liable to be mistaken, so that they may be able to make the diagnosis from the clinical symptoms, which should be comparatively easy in any case of moderate severity, and will be rendered positive by finding the trichinæ in the suspected meat or in the stools or muscles of the patient. Yet in a large proportion of the cases reported, the disease is at first supposed to be something else, and many cases probably escape detection altogether. It is the most widely disseminated and deadly of all known parasitic diseases, and its early detection is of the utmost importance, not only to render treatment effective in the case of those

already affected, but to prevent other persons from contracting the disease from the same source.

Grawitz, Virchow's assistant, states that trichinæ were found, on autopsy, in one third of the cases of so-called muscular rheumatism. Probably the proportion of cases would not be so great in this country, but it is quite likely that we may at times be treating former sufferers from trichinosis for rheumatism, when their symptoms are in reality due to the encysted trichinæ. I have had one such case myself, an American, one of the Springfield cases reported to this Society twenty-five years ago by Dr. Calkins; this man two years ago had a severe attack of what I then considered muscular rheumatism, but now suppose to have been due to the presence of trichinæ which had been there twenty-three years. And when we consider the immense numbers of the parasites and how thickly the muscles are studded with them, it is surprising that, after migration has ceased and they have become encysted, the muscles should so quickly recover their function and show so little effect from their presence. So far as I know, but two or three of those who suffered in this epidemic have had symptoms, since their recovery, which might be attributed to the presence of the trichinæ.

In Germany many more cases of trichinosis are reported than in this country, which must be partly due to the fact that obligatory meat inspection is practised and the attention of physicians more generally directed to the detection of the disease, since in Berlin in 1877, the year before meat inspection became obligatory, only six cases of trichinosis in man were reported; but in 1878, after obligatory meat inspection was established and the attention of physicians called to the subject, one hundred and two cases were reported, with eight deaths.

The occurrence of so great a number of cases in one small community in our midst will serve to show how liable

we are to encounter cases of the disease, and the importance of directing our attention to its detection, when we shall probably find that trichinosis is of more frequent occurrence here in Massachusetts than is shown by statistics.

DISCUSSION.

DR. C. W. MACDONALD, of Roxbury :—I have had five or six cases lately. I have reported these cases in the *Boston Medical and Surgical Journal* of June 2, 1892. There are two points I may refer to. Children who had eaten of the infected pork did not seem to be at all badly affected. The symptoms were very mild indeed. They simply had headache and fever following, which passed off in a day or so, though they ate considerable of the pork. The mother of these children, in addition to the usual symptoms, had a bright red rash which appeared all over the body and gave considerable annoyance by the intense itching it produced. It passed away in two days and we could not attribute it to any other cause than that it accompanied the trichinosis.

DR. J. H. MCCOLLOM, of Boston :—The history of the trichina spiralis dates back to 1821, when Hilton described calcified trichina capsules. He, however, considered them to be the cysticercus cellulosa. In 1822, Miller of Heidelberg described these capsules. In 1828, Peacock deposited in the museum of Guy's Hospital, London, a muscular preparation containing the capsules, calcified. This parasite was, however, first fully described by Mr. Owen in 1835, from a specimen given to him by Mr. Paget. In March, 1842, the late Dr. H. I. Bowditch read a paper on this subject before the Boston Society for Medical Improvement, in which he gave a very elaborate account of the parasite. In describing the case Dr. B. says : "the muscles and cellular membrane seemed to be literally covered with myriads of white lines, looking at first sight like the ova of the common house-fly." This writer estimated that the number of these white lines in the patient's body must have been, at least, 7,680,000. At this time the method of in-

troduction of the parasite was not known, as Dr. Bowditch says near the end of his article that the question of the manner in which the animal got into the patient's body is wrapped in darkness. Virchow had not seen a case until 1859. Zenker's famous case, in 1859, brought the subject into prominence, and may be considered the starting point of accurate knowledge of the disease. The history of this case, as given in Ziemssen, Vol. III., page 617, is as follows: "A girl, aged 20, previously healthy, had been ailing from Christmas, 1859; she was forced to go to bed on New Year's day, and on January 11, 1860, was admitted to the Dresden Hospital. The symptoms in the beginning were great debility, sleeplessness, loss of appetite, constipation, heat and thirst. In the hospital high fever, a swollen and painful condition of the abdomen, extreme tenderness of the muscular system, especially of the extremities, contractions of the knee and elbow joints and œdematous swelling, especially of the leg below the knee, were observed. Death subsequently took place with the symptoms of pneumonia. The autopsy revealed only an extensive collapse of the left lung, interspersed with small infiltrated spots, intense bronchitis, and marked hyperæmia of the mucous membrane of the ileum. The microscopic examinations of the muscles showed in every preparation dozens of the trichinæ lying in the muscular parenchyma in all forms, curled and extended, and giving the most positive signs of life. Together with these there were many shorter, broader, younger specimens. In every drop of intestinal mucus were numerous sexually mature trichinæ, the males one and one half and the females four m. m. in length. It was found that, on the estate at which the girl had served, a hog had been killed Dec. 21, 1859; Zenker discovered very numerous capsulated trichinæ in the remaining preserved hams and sausages. It then appeared that the hostess, the proprietor, and the remaining inhabitants of the place were sick at that time, the two former undoubtedly from trichinosis; the butcher who had killed the hog was also taken very ill with symptoms of trichinous 'gout.'"

In 1859, 1860, and particularly 1862, many cases were reported in Germany. The most extensive outbreak of this disease on record occurred in October, 1863, at a small country town of Prussia near the Hartz Moun-

tains. One hundred and three persons, mostly men in the prime of life, were infected from sausages; 20 died and 80 were made more or less ill. In this country in 1864, Dr. Joseph Schnitter, of New York, reported two cases. Nine cases were reported at Marion, Iowa, in 1866, by Dr. Joseph H. Wilson. In 1867, Dr. M. Calkins, of Springfield, reported thirteen cases and one death from this disease in that city. In 1868, Dr. E. K. Hun of Albany, N. Y., reported two cases of this disease with one death. Dr. George Sutton, of Aurora, Ind., in 1874, published a pamphlet on this subject, giving an account of nine cases that occurred in Dearborn County, Ind. There were three deaths. In one of the fatal cases the body was exhumed one week after death and a portion of the gastrocnemius removed for microscopical examination. It was found that in this specimen the trichinæ showed some evidence of motion. Dr. J. T. Mills, in 1888, reported nine cases and one death as occurring at a farm near Johnstown, Licking County, Ohio. In the same year, Dr. C. E. Johnson, at the request of the State Board of Health of Ohio, investigated an outbreak of eight cases of the disease near Sidney. In the Monthly Bulletin of the Iowa State Board of Health for March, 1891, Dr. G. C. Moorhead of Ida Grove, reports eleven cases and five deaths. In all of the fatal cases pneumonia developed from five to seven days before death. In these cases what is known as summer sausage was the cause of the attack. The method of curing summer sausage is by seasoning, putting into casings and exposing to smoke for a few days. This pork is eaten raw. There had been no deaths in Massachusetts from trichinosis for about fifteen years until the deaths reported by Dr. Drew occurred. In the middle of April of this year, 1892, eight cases with one death occurred in Boston. These cases could be directly traced to the hams of one pig. A microscopical examination of these hams was made by the State Board of Health, and they were found to be loaded with trichinæ. In the non-fatal cases, although there was no microscopical examination of the tissues of the patients, the history of the attack as given by them was characteristic of the disease. Although comparatively few cases of trichinosis are reported, it is probable that the disease is much more frequent than is generally supposed, from the fact that at autopsies

from one to two per cent. of the bodies are found infested with calcified trichinæ.

The rarity of the disease renders the diagnosis extremely difficult. Rheumatism, typhoid fever and typhus fever are frequently confounded with it. Diarrhœa is frequently a prominent symptom in trichinosis as well as in typhoid fever. The muscles present various degrees of swelling and hardness. The patient lies with the knees drawn up and with the arms sharply bent; presenting somewhat the appearance of a person suffering from an attack of acute rheumatism. Delirium of an active form is not present, but there is a peculiar apathetic state of mind. Œdema of the eyelids and face is an important pathognomonic sign; appearing about the seventh day; disappearing in about five days; and returning in some cases after a few weeks. Violent and tumultuous action of the heart is often a prominent symptom in the first week of the disease due, probably, to the irritation of this organ by the parasite. The constant movement of the heart, however, soon drives the intruder to other and more quiet parts of the system. This is probably the reason why at autopsies trichinæ have not been found in the heart when every other organ of the body has been invaded. The immediate cause of death, in a very large proportion of cases, is insufficiency of respiration due to the immense number of trichinæ in the respiratory organs, the draphragm, and muscles of the larynx.

A few words regarding the natural history of this parasite may not be amiss. It is found in two forms, the intestinal trichinæ and the muscle trichinæ. The mature intestinal trichina is a fine, round, slightly-coiled worm. The males are a m.m. and a half long. The females are from three to four m.m. long. At the caudal extremity of the males are two lobular masses, the penis and the anus. In the females the genital opening is situated at the junction of the first and second quarters of the whole body. The embryos are born living. The birth of the embryo begins on the seventh day after the introduction of the muscle-trichinæ into the stomach, and may continue for weeks. These embryos soon emigrate to the voluntary muscles by penetrating the intestinal wall. In some instances it is possible that the embryo may penetrate the coats of the blood-vessels and be carried by the circulation to the different parts of

the body. After reaching the muscles they force themselves into the primitive fasciculi, increase in size and finally roll up in coils. The sarcolemma of the primitive fasciculus around the trichinæ enlarges and forms the capsule by the proliferation of cells. In fourteen days the muscle-trichinæ attain their full size,—0.7 to 1.0 m.m. in length. After a time a deposition of lime salts takes place in the capsule, and they then present the appearance of small white dots or lines which can be seen with the naked eye.

All animals may become infested with trichinæ, the carnivorous through the medium of their food; the herbivorous by drinking-water. The vitality of this parasite is very great; it may live for a long time in decomposing flesh and in water. Trichinæ have been discovered in all countries where investigations have been made, but this parasite has been found to prevail to a greater extent where it is the custom to feed swine on city swill and the refuse from slaughter-houses. The present method of rearing swine, in some localities, is a perpetual menace to the public health and demands the careful attention of Boards of Health.

The symptoms caused by the presence of this parasite in the hog are practically similar to those observed in man, although there have been no very extended investigations regarding this subject. The fact, however, that hog cholera and trichinosis are independent diseases has been conclusively proved.

In the twentieth Annual Report of the State Board of Health of Massachusetts, Professor E. L. Marko, of Harvard University has published a series of very exhaustive investigations regarding the prevalence of trichinæ in swine slaughtered for food. This observer found that of 3,298 hogs raised in Massachusetts, 436, or 13.22 per cent., had trichinæ; while of 888 swine raised principally in the West, only 21, or 2.36 per cent., were trichinous. Of the 234 hogs raised in State institutions, where in some instances the animals were fed on the refuse from slaughter-houses, a practice which has now been abandoned, 42, or 17.95 per cent., were found to be infected with trichinæ. Infection of hogs by eating trichinous rats may sometimes occur; but this cannot be considered an important factor in the causation of the disease. The only explanation of the prevalence of the parasite in Eastern hogs as compared with

Western is the fact that in the former section the animals are fed on house offal, which always contains more or less uncooked meat, and on the refuse from slaughter-houses; while the latter swine are fed on corn, acorns and grass. In the thirty-ninth Annual Report of the Massachusetts Board of Agriculture is an extremely valuable paper by Mr. Theodore Louis, of Louisville, Wisconsin, on the "Breeding and Feeding of Swine," in which great emphasis is laid on the importance of wholesome food for these animals. If the directions given in the paper were followed, the percentage of cases of trichinosis would be very much diminished. The remark is frequently made that the disease is so rare that it is unnecessary to make any regulations regarding it. Although there have been only some twelve or fifteen reported cases in Massachusetts in the past fifteen years, it is reasonable to suppose, from the difficulty of making an exact diagnosis, that there may have been many cases that were not reported. As a matter of fact the disease is much more common in man and swine than is generally supposed. Microscopical examinations prove the truth of this statement.

It is frequently said that cooking renders pork infested with trichinæ harmless. While it is true that a temperature of 170 degrees F. will destroy the parasite, it is also true that in many instances the interior parts of large hams, during the process of cooking, are not heated to this point. There are also many of our citizens who prefer, possibly from motives of economy or from habit, to eat underdone pork; and they certainly should be protected.

In European countries at the present time there are very stringent regulations regarding the microscopical examination of swine slaughtered for food. In this country a microscopical examination is made only of pork that is intended for exportation to European countries. These examinations are made under the direction of the Bureau of Animal Industry at Washington, D. C. To show how carefully these examinations must have been made and of the benefit that has been derived from them, it is sufficient to say that the stamp of the U. S. Government Inspector on American pork places it on an equality with that of Germany.

If, for the export trade, a well-conducted system of microscopical examinations of pork intended for food has

been inaugurated, how much more important it is that a similar system should be established for the examination of pork intended for home consumption.

In order to render pork absolutely harmless as an article of diet the following measures are requisite :—

(1.) Regulations regarding the feeding of swine ; particularly the prohibition of the use of city swill and slaughter-house refuse.

(2.) Microscopical examination of a portion of the carcass, as is now done with pork intended for exportation.

(3.) Regulations regarding the proper housing of swine.

(4.) Instructions regarding the importance of properly cooking pork.

ARTICLE XXIV.

BACTERIOLOGICAL AND CLINICAL INVESTIGATIONS INTO THE NEW ANTISEPTIC DERMATOL.

By ARTHUR K. STONE, M.D.
OF BOSTON.

READ JUNE 7, 1892.

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BACTERIOLOGICAL AND CLINICAL INVESTIGATIONS INTO THE NEW ANTISEPTIC DERMATOL.

Last August, while looking over the Berliner klin. Wochenschrift, I saw the statement by Heinz in regard to an antiseptic powder which was to take the place of iodoform. And as the report showed that the material, a subgallate of bismuth which he called dermatol, had been produced after a long course of experimentation, during which many compounds had been tried, but rejected as unsuitable, I determined to try the dermatol during my Dispensary service, and see how my results would coincide with the claims made for it by Heinz. Accordingly I had the apothecary at the Dispensary secure a quantity. I began its use about the middle of September, 1891, and continued until the end of my service, January 1, 1892.

During all this time I used the gallate of bismuth in practically all the cases that presented themselves, where iodoform, aristol, or a simple, inert powder would have been indicated. During this time there were over 1300 new patients treated in the surgical department, so that I had abundant opportunity to observe where the new powder was useful, and where it was useless.

I purposely avoided reading any of the articles which appeared at various times upon the subject, so that I might be able to form an unbiased opinion as to its working. I found that my clinical observations were in almost complete harmony with the work already reported, while my laboratory experiments showed some points of difference.

The sub-gallate of bismuth was first produced in the Pharmatological Institute of the University of Breslau, and the preliminary report was made by Heinz and Liebrecht.

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They had set themselves the task of producing a non-poisonous, bacteriacidal powder, which should aid wound healing after the manner of iodoform and aristol. To accomplish this, they tried, first of all, the other iodine compounds, and though many were found which were valuable in destroying germ life, yet the great ease with which they were broken up and yielded their iodine made them too dangerous to the patients. Iodoform alone appeared to have any stability. In none of their animal experiments were they able to find free iodine in the urine. The change probably only takes place if certain decomposing, aromatic bodies are present, which cause iodine to be set free.

After iodine, the phenol bases were tried throughout a long list, but these, too, had to be rejected, because of their irritating properties. Finally gallic was selected as the reducing agent, as it was non-poisonous, and present in 1-10 per cent. solution it was found to check entirely bacterial decomposition. Bismuth, after many experiments, was found to be the best element with which to combine the gallic acid.

That this compound was non-poisonous was proved by a large number of feeding experiments supplemented by subcutaneous and intra-peritoneal introduction of the material into animals, before it was used in the clinic.

The result of this patient, painstaking work was that the profession was given a saffron-yellow powder—

Insoluble in water, alcohol or ether,
Odorless,
Non-hygroscopic,
Astringent,
Non-poisonous,
Non-irritating,
Stable, being unaffected by steam or dry heat, in the process of sterilization, and having the power to check bacterial growth to a certain extent, though this was not claimed for it by its sponsors.

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The opinions of various men who have used the subgallate of bismuth in their clinics is briefly as follows:

Dr. Sackur, surgical assistant at Breslau, considers it a ready, odorless, harmless material for advancing healing in all fresh, *aseptic*, and well-granulating wounds. On account of its drying properties and being absolutely non-irritating and non-poisonous, a sufficient quantity can be used to secure almost complete dryness of all wounds, and thus make the probability of healing without suppuration much greater.

2d. All phlegmonous conditions and freshly opened abscesses should, after being treated by free incision, be cleansed and dressed with moist antiseptic dressing before dermatol can be used. But when the wound is once cleansed, the healing is materially hastened by the dermatol dressing.

3d. It is of no value in torpid, slow granulating wounds and ulcers.

4th. No specific working against tubercular disease has been observed, as in the case of iodoform.

v. Rogner of Vienna, after six weeks' use of the material in all cases where he would have used iodoform, writes that dermatol is a splendid wound-healing material, best in superficial and fresh wounds, but of great value in abscesses and phlegmonous wounds that have been thoroughly opened, the necrotic tissue removed, and washed with corrosive. Such wounds clear themselves in a short time, the secretion quickly disappears, and a dry, red, granulating surface presents itself. On the whole he considers dermatol the best dry antiseptic we possess.

O. Rosenthal, in a paper before the Berlin Dermatological Society, reported cases of hard and soft chancres, balanitis, purulent lymphangitis, burns, gonorrhœa, leg ulcers, etc., all treated with this material, and all giving very satisfactory results. But the best results which he obtained were in

moist eczemas, of which he treated a large number of cases. He concludes by stating that in his opinion dermatol will prove of great value in dermatological practice.

In a later paper Rosenthal speaks of his further use of the sub-gallate of bismuth in his clinic, and states that it has fully come up to all that was anticipated of it. He claims an almost diagnostic value for it in cases of ulcers of the penis, specific ulcers healing very rapidly, while chancroids healed not nearly so rapidly as under other dressings. This latter does not coincide with my own observations.

Dr. E. Glaeser, of the gynæcological department of Breslau, considers that dermatol is no substitute for iodoform in foul, necrosing wounds, but is of great value in fresh wounds, granulating wounds and well cleansed cavities. Its superiority lies in the fact that no drying antiseptic so completely favors the primary union of aseptic wounds, especially in all plastic, and fresh post-partum and perineal wounds, where the primary union is always in danger from abundant secretion. In foul abortion cases, Glaeser still holds to the use of iodoform.

Robert Asch (Breslau) writes that, although the sub-gallate of bismuth appears to possess only slight antiseptic properties, through its eminent drying powers it is able to promote indirectly the aseptic healing of wounds, and has besides the excellence of being non-poisonous and non-irritating, and is unchanged by sterilization. In cervix tears it is much superior to iodoform, because it prevents the large amount of secretion that is usually present. On the other hand, in inoperable, sloughing carcinomata uteri where great numbers of bacteria are present, the sub-gallate is of little use. Most notably dermatol shows its powers in fresh tears of the vagina and perineal plastic operations. Here it protects the wound and stitches from being soaked. One can let silk stitches lie loosely under a thick layer of dermatol, covered with dermatol gauze, for days at a time,

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and they will remain dry and without stitch abscesses. Asch has also used the dermatol gauze in vaginal tamponade and in vaginal catarrh with good results.

Bluhm has used the sub-gallate of bismuth in cervicitis, but with varying results. In other respects his results do not differ from those already quoted, and he is an enthusiastic advocate of its use in minor surgery and dermatitis.

Dornberger has used the sub-gallate of bismuth in a number of cases in a children's clinic, and reported the same. He found it of special value in cases of moist eczema, and in fifteen cases all were quite dry in one or, at the outside, two days. Burns and scalds healed quickly and with little formation of serum, and he was favorably impressed with the way that tubercular ulcerations acted under dermatol dressings; and in all cases where these dressings were used there was no appearance of dermatitis, —something of special importance in the delicate skins of children.

Dr. Powers, of New York, practically agrees with the foregoing expressions of opinion. He saw no irritation caused by the material, but on the other hand any irritation present quickly disappeared. He reports one case where symmetrical ulcers of specific origin were treated one with iodoform and one with dermatol, the latter healing in less than one third the time of the former.

Davidsohn reports the use of dermatol in fifty patients at the ear clinic in Berlin. While some of the cases improved very rapidly and a few cases improved, when before they had been unsuccessfully treated with boracic acid, on the whole he is inclined to the opinion that the results in purulent otorrhœa were no more satisfactory than those obtained by treatment with boracic acid.

Dr. F. L. Jack, of the Massachusetts Eye and Ear Infirmary, has told me that in his opinion healing was materially hastened in cases treated with the sub-gallate

of bismuth where formally he would have used boracic acid.

Prof. Everbusch of Erlangen has used the sub-gallate of bismuth in wounds of the eyeball ever since its introduction, and finds it of special value in aiding to get good results; and he much prefers it to iodoform, which he formerly used.

None of the writers thus far quoted have seen anything to lead them to believe that the dermatol was at all poisonous. One case of diarrhœa and one of jaundice occurred in the hospital at Breslau, while the experiments were being made, but in both these cases the trouble persisted for some time after the use of the dermatol was given up. It was not considered as proved, therefore, that they were caused by the dermatol.

Dr. Weissmüller reports seven cases of ulcer of the leg where dermatol was used without success, all of which quickly healed under his own powder. While under the dermatol treatment one of the men complained of vertigo and itching skin. As there is no further mention of these symptoms, the author would have us infer that they disappeared when the use of the dermatol was abandoned; but he does not state it. The second case was that of a woman who had a moist, painful ulcer on the foot. The author strewed dermatol over a large area. Three days later he found her in bed, temperature 39 C.; headache, general lassitude, and without appetite. There was also itching over the whole body, and a burning eruption. On the foot there were blisters filled with serum. The dermatol was removed and his own powder substituted. Two days later the eruption was less and the burning gone, but the patient was weak, restless and sleepless, and complained of headache. At the end of four days she was able to attend to her daily duties.

My own experience began, as I have said, about the middle of September. One of my first cases was very

striking. I opened a large bubo in the groin and evacuated about four-fifths of the pus, and without waiting to wash out the remainder I packed the whole cavity with dermatol. At the first dressing, two days later, I was surprised to find only a thin, sero-purulent discharge and a good, clean, granulating surface; and a week later the patient was discharged. I found that this did not take place every time; that unless the abscess cavity was thoroughly curetted and cleaned out, the secretion of pus still persisted and the old, slow process of healing followed. Six or eight Cotting's operations for ingrowing toe-nail granulated quickly, and were so dry throughout that they allowed a very light dressing to be worn, which was a great gain for the convenience of the patient.

I laid open and curetted a sinus with multiple pockets in the neck, caused by suppurating glands. The wound was about 4 inches in length and ¾ to 1½ inches in depth. I had hoped to close the wound by sutures, but the pockets made it seem best to allow it to granulate up. So I filled the wound with dermatol, and at the end of two weeks the patient came again to see me with the wound entirely closed, it having been dressed twice in the meantime by Dr. Richardson of East Boston.

In a case of specific or tubercular diseases of the testicle, where removal was necessary, I found, on taking off the dressing on the third day, that everything was soft and moist, and the scrotum was distended with a sero-hemorrhagic fluid. Along the whole length of the wound the stitches seemed moist, and the whole appearance was that of a wound that was going to gape open in a few hours; and a general moist eczema threatened the whole scrotal surface. But the removal of as many stitches as possible and the bountiful application of dermatol made the whole skin nearly dry, at the next dressing, and enabled me to get a primary union along the cut surface. From my experience

with such cases I am sure that I should not have accomplished this result with any of the other active or inert surgical powders.

Crushed fingers heal very kindly under the powder, and the checking of the secretion tends to make the danger of infection much less. Of course, all such fingers were at first treated to a prolonged antiseptic bath.

The non-irritability of the bismuth compound may be seen from the following case. I removed a wen from a woman's head. The sac had been inflamed and was adherent, so that I was not sure I had removed all. To check possible suppuration I filled the cavity left with dermatol, and sent the woman away. For reasons known only to herself, she did not come back again for three weeks. At the end of that time, she returned and said that the wound had never closed. I looked to see what was the matter, and found the cavity full of dermatol that was nearly dry, and there were no signs of inflammatory reaction about the wound.

Sores of the penis I found could be kept dry more easily than with aristol, but I could see no gain in the time of healing, only the gain of having less secretion. The same I found true of sores in the vagina,—after one or two treatments the discharge was less; but the patients rarely stayed long enough to allow completed observation.

Superficial excoriations and burns of the first degree yield very rapidly to the use of dermatol, the surface drying quickly and thus allowing the epithelial growth to take effect; while with other dressings, the moisture often macerates the epithelial layers almost as rapidly as they are formed. A case in point is that of an old man who had been struck by a locomotive and had a large excoriation on his right shoulder. Dermatol was plentifully scattered over the surface, and over this was a dry gauze dressing, held in place by plasters. On the second day, all but a sur-

face of about an inch square was healed, and this yielded, in spite of the old man's wishes, in a few days more.

In chronic, moist eczematous ulcers of the leg, the soft, boggy skin surrounding the ulcer, after a few dermatol dressings, usually became dry and tough enough to allow the tin plates or stimulating applications to be made to the ulcer proper, to establish granulation.

Irritation of the skin, starting from the heat of a heavy dressing, I have repeatedly checked by the single application of dermatol; and moist, oozing eczema usually yielded to a few dressings of the powder.

In no case that I treated did I see any signs of poisoning, either local or general, although half a dram to a dram was repeatedly used, and I was spared the mortification of having to battle with an almost irresistible dermatitis, something that never happened to me before in the same length of time of out-patient service.

Dermatol I found absolutely useless to start granulation in any case where the wound has become sluggish. Indeed, in all such cases it tends to increase the trouble.

One thing must be guarded against. A thick, dry crust of serum and dermatol may form over a wound, and make a perfect little culture chamber for any bacteria which may chance to be on the surface of the wound below. And an accumulation of pus may thus be pent in below the crust, when externally the wound looks to be in a perfect condition.

My clinical observations having on the whole coincided with the work of the men whom I have already quoted, my next point was to carry out some laboratory experiments, to see whether the dermatol really hindered bacterial growth, or acted simply by its (so to speak) mechanical astringent properties, checking secretion and thus depriving the plants of the moisture necessary for their development.

The results of those who have already experimented with dermatol on its bacterial side may be summarized as follows:

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(1) Bacteria, mixed with the dry powder and allowed to stand for twenty-four hours, grow when planted on agar or gelatine; though in an experiment, where a mass of staphylococcus pyogenes aureus was mixed with dermatol and put into a pocket beneath the skin of a rabbit, no abscess resulted, while in the "control", when the aureus alone was used, an abscess developed in the usual time.

(2) Thread experiments gave no better results than the control, when inert powder was used.

(3) When the sub-gallate of bismuth was mixed with galatine or agar, growth usually took place unless the amount of dermatol present was very large, when it was partially or wholly checked.

(4) When dry dermatol was strewn on the surface of tubes of gelatine or agar which had been planted with bacteria, the results have differed. In many cases no growth appeared; in others apparently no hindrance to growth was present. Bluhm gives a list of twelve different varieties of bacteria which he has experimented with, and his results were decidedly in favor of the destruction from the dermatol. In many cases he was unable to find live bacteria on the surface after a few days.

(5) Bluhm also obtained positive results of the retarding action of the dermatol in tubes where the nutrient medium had been colored with an indigo-carmine solution, which is decolorized by the products of bacterial growth. The color disappeared in the control tubes on the third day, and in the dermatol tubes from the tenth to the fifteenth day, according to the amount of the powder used. In these experiments the absence of air was secured.

(6) In flujds the growth of bacteria was not influenced, so far as was observed, by the presence of the dermatol.

The late Dr. John A. Jeffries, in his able paper on the Antibacteriological Action of Iodoform, exposed the fallacy of deductions made from tube and thread experiments. He

also showed that iodoform did have some effect in checking bacterial growth, and suggested as an explanation of this, that was later confirmed by Behring in Germany, that the favorable action of iodoform was doubtless due to its chemical combination with various products of bacterial growth, —the so-called ptomains. I shall endeavor to show that a similar change takes place when bacteria are grown in the presence of the sub-gallate of bismuth.

In the first set of experiments I planted four gelatine tubes with pus from a newly opened abscess, and keeping a control tube, dusted the surface of the other tubes respectively with iodoform, aristol and dermatol. No difference could be seen in the rapidity with which the bacteria grew and liquified the gelatine in all the tubes.

A series of experiments were made where the sub-gallate of bismuth and iodoform were added to equal amounts of melted gelatine and agar. The contents of the tubes were then cooled so that the powder should be mixed as thoroughly as possible through the nutrient media, when cooled. In some half dozen comparative series, I found that there was practically but little difference in the amount of growth on the variously modified media. Sometimes the growth appeared equal in all respects to the control, while at others there was a marked hindrance to the growth.

In several instances there was a change of color produced by the presence of either dermatol or iodoform. This was most marked in one case, where an orange coccus, grown on gelatine and dermatol, became a dark brown, and the same plant, grown on gelatine with iodoform, lost its color and was white. Planting again on agar, the brown returned at once to its original orange, while the plant grown on iodoform only showed traces of color in the second generation. In another case, where I planted a white coccus taken from a wound, probably a staphylococcus pyogenes albus, on gelatine to which dermatol had been added, the

liquefied portion became gray, and finally inky black, due in all probability to the presence of the sulphide of bismuth.

These observations go to show that bacteria grown in the presence of sub-gallate of bismuth and iodoform are able to change the chemical combination of the powders present; and in order to bring about this change, it is fair to suppose that the products of bacterial growth, the so-called ptomains, are also changed.

CULTURE TUBE EXPERIMENTS.

GELATINE.	CONTROL.	DERMATOL.	IODOFORM.
Staphylococcus pyogenes aureus. (?)	Slow growing, liquefying the gelatine. Color, light orange.	Strong growth, slow liquefying. Color, dark brown.	Fair growth, slow growing, slightly liquefying, white.
Mixed culture from pus.	Slowly liquefying. Color, yellow and white.	Less liquefaction. Color, brown.	Thin line of growth. Color, white.
Pus from suppurating wound.	Growing and liquefying with equal rapidity.		
Albus (?) from sloughing wound.	Rapid growth, liquefying.	Growth and liquefaction more slow than control. Fluid gray; later, black.	More slow than control, no change in color.
Light yellow coccus from syphilitic testicle.	Heavy and rapid yellow growth.	Very slight growth. Color, yellow.	Growth about like control. Color white.
Deep orange coccus.	Small growth, not liquefying.	Very slight growth. Brighter orange.	No growth.
Agar agar tubes.			
Red yeast.	Small growth.	Less growth.	
Aureus.	Heavy growth.	No growth.	
Crookshanks.	Good growth, color only at edges at first.	Equal growth. Color, stronger; later, fading.	
Green pus bacillus.	Good growth, mass of bacilli white.	Tube a, b } Growth like control. Tube c } Mass of bacilli black.	
Staphylococcus cereus flavus.	Heavy yellow growth.	Tube a } Very slight growth. Tube b } No growth. Tube c } Less than control, mould contamination.	
Gelatine tubes planted with pus from abscess of the hand and the powd'rs dusted on	All grew and liquefied the gelatine with equal rapidity.		

As the ptomains are now recognized as the probable cause of septic conditions, and as frequently the poisonous differ from the innocuous only by the change of the arrangement of a few atoms, the fact that the modification of the

ptomains does occur is a fact of importance in considering the merits of any antiseptic powder.

QUANTITATIVE EXPERIMENTS.

Remarks.	Control. 1st 5 estimated.	Dermatol.	Iodoform.
In first five experiments, .5 c. g. dermatol or iodoform used.	32,400 colonies.	Sterile. Sterile. 5 colonies.	1123 1991 2475 } Colonies.
Same as ex. 1. 24 hours later.	12,600 colonies.	Sterile. Sterile.	336 142 } Colonies.
	Diminution due to starvation in distilled water (?).		
	9,020 colonies.	2 colonies. 28 colonies.	1920 colonies.
Same bouillon tubes, 5 days later.	23,400 colonies.	2937 colonies.	2194 colonies.
	Heavy growth.	2 colonies. 1 colony.	Plate spoiled.
.2 c g. used yellow coccus from syphilitic testicle.	Plate destroyed.	Sterile.	
Aureus, old culture.	233	3	
Crookshank's purple.	One large colony.	Sterile.	
Aureus, recent culture.	10,000 estimate.	Sterile.	
Albus.	50	Sterile.	
.3 c. g. used. Staphylococcus cereus flavus.	82 large colonies.	a. 61 small colonies. b. Sterile. c. Sterile.	
Green pus.	Very heavy growth.	a, b, c } Very heavy growth.	
Anthrax.	Heavy growth.	6 colonies.	

I lastly made a number of quantitive experiments, following the line of Dr. Jeffries in which he obtained most positive results in his work on iodoform. My method was as follows: I added a small number of bacteria to tubes containing 10 c.c. of bouillon, and bouillon to which equal amounts of iodoform and dermatol had been added, and let the tubes of the same series remain under similar conditions, *i.e.*, some series remained 24 to 48 hours in the constant temperature apparatus; others stood at the room temperature; and some were left partly at room temperature and partly in the thermostat. When ready, I took accurately measured amounts from each of these tubes and added this to tubes containing 10 c.c. of sterilized water; and taking a measured amount of this dilution, I added it to agar tubes

where the agar was just on the point of cooling, and made agar plates. These plates remained in the thermostat a sufficient time, and the colonies were then counted. By this means I was able to get a fairly accurate quantitive result, and a comparison between the free growing bacteria and those grown in the presence of iodoform and dermatol.

The conclusions that I have drawn from my investigations are, that the sub-gallate of bismuth, called dermatol from its astringent properties in checking secretion—also, its odorless, non-irritating, non-poisonous properties—has proved itself to be a valuable addition to the surgeon's armamentarium. And the laboratory experiments show that in addition to its mechanical power of repelling water, and thus producing a food famine and consequent death of many of the bacteria, that it has active powers in hindering bacteria growth, although it does not have bacteriacidal action. The method by which this hindrance is accomplished is probably due to its chemical combination with the ptomains produced by the growth of the bacteria, forming compounds hostile to their rapid development.

NOTE.—I use the word ptomains according to the definition of Brieger, and they include all nitrogenous bases that are formed by the action of bacteria.

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ARTICLE XXV.

ACUTE INTESTINAL OBSTRUCTION.

A DISCUSSION.

THE SYMPTOMS AND DIAGNOSIS:

By FREDERICK C. SHATTUCK, M.D., of Boston.

THE SURGICAL ASPECTS:

By JOHN HOMANS, M.D., of Boston.
JOHN C. IRISH, M.D., of Lowell.
J. COLLINS WARREN, M.D., of Boston.
ARTHUR T. CABOT, M.D., of Boston.

JUNE 7, 1892.

ACUTE INTESTINAL OBSTRUCTION.

The Symptoms and Diagnosis.

Dr. F. C. Shattuck, of Boston:—Modern surgery, which does not hesitate to explore the intimate structure of nearly every organ except the heart, has awakened fresh therapeutic interest in subjects which, but a few years ago, seemed from their very nature incapable of further material advance. The possibilities thus opened render it important constantly to review our knowledge, and to strive to perfect accuracy of diagnosis, not only for itself but for the help it affords to intelligent interference. As long as the risks of the knife were about as great as those of the condition which it might remedy, the stimulus to accuracy, but above all to promptness of diagnosis, was far less than it is to-day.

Acute intestinal obstruction is a condition which is highly illustrative of the above remarks, and, in what follows, the attempt will be made briefly and broadly to indicate the present status of our knowledge as regards acute stoppage of the bowel, its nature and seat.

The first question which naturally presents itself is the early determination of the existence or non-existence of acute intestinal obstruction in the case in hand. This question is also first in importance. Its solution is generally less difficult than are those of seat and nature, and has a more important bearing on the management of the case. The leading symptoms are abdominal pain, usually sudden and severe, with the more or less rapid sequence of nausea, persistent vomiting, perhaps soon becoming fæcal, distention of the belly, and collapse. The failure of the bowels to move is a less distinctive *early* symptom of the condition then the term obstruction or stoppage of the bowel would seem to imply, and for the following reasons: First, the development of the symptoms may be so rapid in one whose intestinal functions have been previously perfectly performed that non-defecation may be of little or no value as a sign

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during the all-important early period when efforts to move the bowels should be strictly limited to enemata; or, secondly, the contents of the gut below the obstruction may be evacuated spontaneously or artificially; or, finally, the obstruction may be of such a nature as not completely to occlude the lumen of the tube, thus allowing the passage of contents the nature of which may be suggestive. While, therefore, the failure of the bowels to pass fæces or gas is an important, it can hardly be ranked as one of the leading early symptoms.

We must next consider those affections or conditions other than acute obstruction which have similar or nearly identical symptoms, and which must thus be excluded in reaching a diagnosis.

Identical symptoms are presented by any of the forms of external strangulated hernia. To an audience of surgeons it is not necessary to dilate upon this head. And yet I have a vivid recollection of a case in the medical ward of the Massachusetts Hospital in pre-antiseptic days. Well marked symptoms of intestinal obstruction were present and a surgical opinion was sought as to the existence of hernia. The surgeon found no hernia, and expressed the opinion that no hernia could have existed with such normal rings. The autopsy showed that a portion of the calibre of the intestine had been caught in the right ring long enough to result in intestinal paralysis and peritonitis. Vomiting, pain and collapse may be sufficiently marked in a first attack of gall-stone impaction to simulate obstruction of the gut. It may be stated here that experience has led me to distrust the relative immunity of young adults from the results of cholelithiasis, as affirmed in most of the books. If I am right, age and sex cannot weigh much in the differentiation. The seat and character of the pain may be suggestive; the occurrence of jaundice within twenty-four hours is almost distinctive. In recurrent attacks the history of the case is of prime importance. Renal colic is a possible, though not probable cause of error in diagnosis.

The persistent vomiting, epigastric pain, and collapse of acute irritant poisoning need only to be mentioned, the history and circumstances attendant on the case preventing serious danger of confusion.

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Similar symptoms, as Fitz has so well shown, may be due to acute pancreatitis. In this connection a well-known case comes to my mind, a case in which a majority of five to one in consultation decided in favor of laparotomy under the idea that obstruction was probably present. The majority was wrong and Fitz's diagnosis of acute pancreatitis was confirmed. The incidence of this affection, as far as is now known, almost exclusively to middle life; the localization of the pain in the upper abdomen; and the patency of the colon, the transverse portion of which overlies the pancreas, furnish the means of its differentiation from obstruction.

Peritonitis, general and local, so frequent and of such varied origin, gives rise to more difficulty than all other affections combined. The early symptoms may be practically identical, except for the tenderness of peritonitis, and peritoneal inflammation is a natural outcome of acute obstruction. In the one case constipation is of purely mechanical origin; in the other it is dependent on intestinal paralysis which, in turn, is the result of peritonitis. Though the pathological sequence of events is thus not the same, the exact sequence is not always to be made out at the bedside. The forms of peritonitis of special interest in this connection are those dependent on perforation; of the gall bladder; of the stomach or duodenum from peptic ulcer; of the appendix.

The former is so rare that mere mention suffices. In the second the origin of the trouble may at times be recognized by the history of the case in connection with the starting point of the pain. The special liability of young women of the working and servant class to gastric ulcer may be of value. In duodenal ulcer, sex, age, and condition in life afford small aid in the distinction from obstruction. It must, moreover, be remembered that the base of a peptic ulcer may give way without a single precedent sign of the existence of such a lesion.

In the past the symptoms of appendicitis were not infrequently wrongly attributed to obstruction. At present the opposite error is, perhaps, quite as likely to be made; that, namely, of diagnosticating obstruction as appendicitis, so much attention has the latter affection received of late. A notable instance of this error, fortunately corrected in time,

is recently reported by Douglas in the *Medical Record* of May 14, 1892. It is more likely to occur in those rather exceptional cases in which the pain is referred to some part of the abdomen other than the right iliac region. In these the sharp localization of the maximum tenderness at the first, as is strongly insisted on by McBurney, is a point of value.

While keenly alive to the limitations of differential diagnosis by tabular statement I venture to append one which presents some of the points of contrast between peritonitis and obstruction.

	Peritonitis.	*Obstruction.*
Initial chill.	Not uncommon.	Lacking.
Fever.	"	" until peritonitis.
Tenderness.	General from the first.	Late, at first local.
Vomiting.	Early, perhaps persistent in both.	
	Seldom feculent.	Often becoming feculent.
Constipation.	No really distinctive point.	
Abdominal wall.	Tense early.	Tense late, if at all.
Tympany.	General early.	At first local, later general.

Finally, in very rare cases, enteritis may present a picture similar to that of obstruction, and dysentery may simulate one form thereof, invagination. A twisted pedicle or rupture of an ovarian tumor, and ectopic gestation are possible causes of error.

Granting, now, that the diagnosis of acute intestinal obstruction has been reached without reasonable doubt, it remains to determine, if possible, the seat and nature thereof.

The nature of the obstruction is, in many cases, difficult or impossible to make out without laparotomy. The following are, perhaps, the leading points which may assist in the solution of the question.

Intussusception is the form which may possess the most distinctive features, and is responsible for at least one-third of all cases of obstruction. No cause is so frequently operative in early life, although it may be found at any age. The pain is usually sudden and severe, and apt to be distinctly paroxysmal owing to the violent peristalsis; nausea and vomiting occur early, the latter seldom becomes fæcal. Tympany is rare as an early symptom. But the characteristic signs are tumor, tenesmus, and the dejections. The former, if abdominal, is usually in the course of the colon

on account of the predeliction of this affection for the cæcal region, is cylindrical in shape, may gradually advance as the invaginated portion progresses toward the outlet of the bowel, and is apt to become more distinct during a paroxysm of pain. The comparison of the rectal tumor to the os uteri is an old one. Tenesmus is frequent and may appear on the first day. This and the discharge of blood or bloody mucus with or without liquid fæcal matter may suggest a diagnosis of dysentery.

It should constantly be remembered that invagination does not necessarily completely occlude the lumen of the intestine, as do most other forms of acute obstruction; diarrhœa is, consequently, often present.

It is thus seen that in a fair proportion of cases a positive and early diagnosis is to be reached.

Strangulation by bands or through apertures is identical in its symptoms with external strangulated hernia. No attempt will be made here to differentiate its several forms. It is operative in from one-quarter to one-third of all cases of obstruction. That on which its occurrence depends being so often the result of previous peritonitis, the history of the case may here have special value. While it is most common in young adults it is not rare after forty. Perhaps the influence of age is here only apparent, there being more people alive between twenty and forty than between forty and sixty.

Pain, nausea, and vomiting are apt to be even more striking than in invagination; and fæcal vomiting, from the second to the fifth day, is more common. Occlusion of the tube is, of course, absolute, and Treves holds that pain is then more apt to be continuous, but distinctly colicky in partial obstruction. The small intestines being the part involved in nine-tenths of all cases, early tympany is less constant and less marked. Constipation is absolute, neither fæces or flatus escaping; tenderness is evidence of peritonitis; tumor and visible intestinal coils or peristalsis are rare. Collapse is early and marked. The diagnosis, if it can be made, is thus based on pronounced obstructive symptoms, in an adult who presents none of the distinctive signs of intussusception, and may have gone through a previous peritonitis, in males of appendicular, in females perhaps of pelvic origin.

Volvulus is most apt to occur between forty and sixty. In the small intestine it is not to be clinically distinguished from internal strangulation. If, as is relatively so common, the sigmoid flexure is involved, the symptoms are, as a rule, less violent and urgent than in strangulation. Constipation is absolute, tympany is more marked; tenesmus is not uncommon. Stricture of the intestine, usually cancerous, is much more apt to give rise to the symptoms of chronic than to those of acute obstruction. Still, the latter occurs so often that it cannot be left out of consideration. A history of difficult and disordered defecation, perhaps for some time, combined with gradual failure of the general health in a person at or beyond middle life, may here be important. The large intestine, and especially its lower portions, being the favorite seat of intestinal cancer, examination of the rectal and sigmoid regions may yield information of value. A tumor may, of course, be formed in part of fæcal masses arrested behind the constriction. If dilatation and compensatory muscular hypertrophy have taken place the opportunity is afforded for marked tympany; in no acute form is visible intestinal peristalsis so common. In general, visible coils and peristalsis are more common in chronic cases; and in those persons whose abdominal walls are relaxed from any cause than in the previously healthy and muscular.

Very rarely tumors originating without the gut compress it suddenly and thus cause obstruction. If the previous existence of the tumor was known, the fact may be of considerable importance. If not, an attempt must be made to determine whether it is fæcal, imflammatory or neoplasmic.

Obstruction by foreign bodies is mainly due to the impaction of gall-stones in the small intestine. A history of previous biliary obstruction may be suggestive.

Fæcal impaction, practically always by the large intestine, rarely gives rise to the cardinal symptom of acute obstruction, and belongs rather under the chronic form. A clear history of previous constipation is the rule. The obstruction may or may not be complete. The pains, vomiting and distention are less urgent, though the latter may be enormous. Collapse is absent or slight, a characteristically fæcal tumor can be felt in the course of the colon or in the rectum in many cases.

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To sum up: positive diagnosis is relatively frequent in invagination and stricture; impossible in volvulus; a strong probability may not infrequently be reached in strangulation; a conjectural diagnosis can sometimes be made in obstruction from gall-stones or compression from tumors.

The diagnosis of the seat of the obstruction is rather less difficult than is that of its nature.

It is to be based on:—

1. The determination of the capacity of the colon which, under anæsthesia, may be made to contain six quarts, a pressure of a column of water twenty feet in adults, twelve in children, being probably safe. It should be remembered that the rectum alone may contain one and one half quarts. If four to six quarts can be introduced, the obstruction is almost certainly at or above the cæcum. The earlier the procedure is resorted to, the less likely is gaseous distension to prevent its full application, or injury to follow its employment; on the other hand the more likely is it to be of therapeutic service, as in intussusception.

2. The situation of the tumor, if such be present, may throw light on the seat of the obstruction.

3. But little reliance is to be placed on the symptoms. It may, perhaps, be stated:—the higher the seat, other things being equal, the less the urine; the higher the seat, other things being equal, the less the tympany. Great excess of indican is not now considered of much value in locating the lesion in the large intestine. When tenderness first appears its location may have some value as indicating the advent of peritonitis which is apt to start at or about the lesion.

The presumable nature of the obstruction has some bearing on the seat. Intussusception involves the large intestine in 90% of the cases; strangulation the small intestine in equal proportion. Gall-stones and foreign bodies obstruct the small gut alone. All other forms are much more common in the large intestine; and all, save perhaps fæcal impaction, are more apt to involve one or the other end of that portion of the canal.

Fitz's statistics show that four-fifths of all acute obstructions are found in the lower abdomen.

First in importance is the diagnosis of the condition that purgatives may be avoided and surgical interference, if

necessary, may be resorted to before the patient's chances are imperilled by notable peritonitis or changes in the nutrition of the gut itself.

Next in importance, though not in ease, is the nature. Intussusception alone offers much chance of medical or expectant treatment.

A determination of the seat determines also the point of election for section. Except in the case of stricture of the rectum or sigmoid, this is a matter of comparatively subordinate importance.

The Surgical Aspects.

Dr. John Homans, of Boston:—Most of the cases of acute intestinal obstruction I have operated on have been caused by a malignant annular stricture of the bowel, or at least malignant disease; but there have been some exceptions.

The first case I operated on for intestinal obstruction was some eighteen years ago, and is the only one of the kind I have ever seen. It occurred after confinement, from inflammatory disease around the uterus which entirely prevented movements of the bowels. The woman, young and healthy, was brought to the Carney Hospital. She had had no movement of the bowels for three weeks, was very much distended and in great pain. Dr. E. G. Cutler was the physician on duty, and asked me to see her. I did a left lumbar colotomy and she was entirely relieved. Operations went on through the artificial anus for some months and then gradually began to come through the rectum, and the last I knew of her almost all the discharges went through the natural passages.

The success of our efforts to relieve people of obstruction of the bowels would come largely from the accuracy of the diagnosis. These people with malignant annular stricture of the bowel very often are taken suddenly. I remember a patient of Dr. A. H. Nichols, a lady from the West staying at the Parker House. She said that her mother had died from cancer of the bowels. She was taken suddenly

with complete obstruction, which had persisted for three weeks when I saw her. She was carried to a private hospital, and having located her pain and symptoms in the right iliac region, I, with the assistance of Dr. M. H. Richardson, ten or twelve years ago on a very hot day, opened the abdomen over the cæcum, found no obstruction at that point, but after much overhauling of the distended intestines finally found in the splenic flexure of the colon an annular stricture. We replaced the bowels, sewed up the wound, made an artificial anus in the cæcum, which relieved her, but she died in a day or two. Dr. Nichols procured the specimen which is now in the Warren Museum. I think the lumen of the bowel was reduced to a size somewhat smaller than the lead of an ordinary lead pencil, and yet she had had, as she said, no symptoms until her final seizure.

Another case was that of a stout Irish woman attacked while working at the wash-tub, in Roxbury. She had had no previous symptoms of obstruction. With the assistance of Dr. Fitz and her physician, Dr. S. A. Callanan, I opened the abdomen and found a mass of cancer behind the uterus which entirely involved the sigmoid flexure. I opened the bowel and sutured it to the skin. The stricture would not admit my finger.

Another case in which I did a left lumbar colotomy was one of almost complete obstruction with great abdominal distention. The intestines could be seen through the thin parietes moving with their vermicular motions and tightly distended. There were severe attacks of vomiting with much pain. The intestines were bound together by adhesive tubercular peritonitis and were also tied to the abdominal and pelvic walls, forming a sort of mound. The ileum was dilated to a circumference of four inches, and its walls much hypertrophied. The large intestine was contracted. Other organs contained tubercular deposits.

Another case was caused by cancer of the rectum in a lady fifty-five years old, with a cancerous family history. She became fat and strong after the operation, and went about wherever she pleased. Her physician found it necessary to keep a drainage-tube in the artificial opening, and about nine months after the colotomy the patient lost the tube in the bowel and would not allow search to be made

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for it. The tube ulcerated through the rectum above the cancer and caused fatal peritonitis.

Another was caused by cancer (annular) of the splenic flexure of the colon.

Another by cancer of the rectum in a lady sixty-five years old.

Another by cancer of the sigmoid flexure and neighboring parts.

Another case occurred in South Boston, and was a fatal one of volvulus in which no operation was done. The fatal twist took place in a woman twenty-eight years old, two years after a laparotomy for pyo-salpinx, and until the autopsy I supposed that the obstruction was in some way caused by the condition of the peritoneal organs left after the laparotomy, but it was simple volvulus of the ileum, and the only one I ever saw. The patient was attended by Dr. Fogg, of South Boston, who called me, and the autopsy was made by Dr. A. K. Stone.

These are some instances of malignant disease.

I have had two cases of traditional obstruction caused by bands or twists. One occurred in Woburn. I was sent for in a great hurry on a short day in winter. I dropped everything and went out to Woburn, and was kept an hour and a half waiting at the station, for some reason unknown to me. They kept me so long that daylight had almost gone when I reached the house. I opened the abdomen and did not find any band, and yet I felt as if there must be something of the kind, and if I had known as much about it at that time as I do now I presume I should have found it. It was a Meckel's diverticulum. I made a opening in the bowel, but so high up that the patient starved to death after a few weeks. That it was a band of a Meckel's diverticulum was shown at the autopsy.[1]

Another case of obstruction, rather sudden, was in a lady a year after ovariotomy, and was caused, I presumed, before I operated, by some adhesion or band between the wound and omentum or bowel. She was a woman of a great deal of character and good sense. I told her I should open the abdomen, and if I could not find the cause of the

[1] The case is referred to in Dr. Fitz's excellent article on Persistent Omphalo-Mesenteric Remains, in the American Journal of the Medical Sciences, July, 1884.

obstruction I should have to make an artificial anus, and she said, "Do whatever you think best." On opening along the line of the scar I found no adhesions, but in the lower part of the sigmoid flexure there was a malignant annular stricture. I made an artificial anus. She lived about a year and died of cancer of the liver. The last year of her life she said was a very happy one, though she could not go into society on account of the escape of gas. As far as movements of the bowels were concerned she got along very well, and was very glad she had had colotomy done.

Another case of obstruction, much more fortunate, where I opened the abdomen and found a stricture of the small intestine to the left of the umbilicus and made an intestinal anastomosis by means of Senn's plates, about a year and a half ago, in a little girl, was very satisfactory. Here there was no cancer. She is now alive and hearty. The stricture, which was complete, was caused by invagination and sloughing of the small intestine three months before I saw her. These openings, which are made by Senn's plates or Abbe's rings or any of the artificial rings, are said to contract. I don't know why they should not contract. At any rate in this girl the opening apparently has not contracted, and as the intestinal contents are fluid in the small intestine, contraction of the opening is not so serious as it would be in the large intestine where the contents are more solid. She is now a stout, pretty girl, but was emaciated to a mere skeleton at the time of the operation, eighteen months ago.

Another man with obstruction of the bowels caused by cancer of the sigmoid flexure of the rectum I operated on a year ago last March. I found I could not make a resection of the sigmoid flexure, and made an artificial anus in the inguinal region. He has gained fifty-two pounds in weight, and was until recently very comfortable. Within the last six weeks the artificial anus had ceased to discharge. I could not see exactly why, because I could inject into it gallons of water, showing that there was no obstruction, and yet for some reason the fæces did not come out of it. About seven weeks ago I made another laparotomy to the left of the former one, and pulled out the large intestine, which presented, until I got a straight pull on the descending colon where it begins to be the sigmoid flexure. You

will find in doing these operations that it is not necessary at all to sew the bowel to the skin. Pull out the bowel, slide a little glass rod, or any rod, across to straddle the wound, and let it alone. The intestine heals at once to the parietes, and in a day or so you can open it. This method makes the so-called spur by holding up the two sides of the bowel. This man has now two artificial anuses, and has recovered and goes about comfortably. I felt if I closed the lower artificial anus, which could have been done quite readily, that he would have about a yard, more or less, of intestine which could not discharge anywhere. The alternative would have been to cut off the intestine below the glass rod and sew it up. However, the operation I did has relieved him. When I came to examine him at the last operation, a year or more after the first one, I put my finger into the distal end of the wound and felt the cancer which had grown up from the sigmoid flexure and is slowly approaching the surface, and I felt many enlarged lumbar glands; but still he is very comfortable. You will see the majority of the cases I have been able to remember have been of malignant disease. I recall three others of malignant disease where I have been called and have operated.

Another case of obstruction which was quite interesting was six months after an ovariotomy. As you can readily conceive, the bowels under the wound had adhered to the under side of the scar in the abdominal parietes at various points, so as to make little holes between the adherent bowel and the scar, and through one of these holes a loop of intestine had penetrated, and at the end of five or six days I was called. I opened the abdomen and found the loop gangrenous. If I had been called early enough, and had operated, I think I could have relieved the patient.

Sometimes cases of obstruction are due to adhesion of the bowel to an abdominal tumor. I have seen this in a fibroid tumor which had become entirely separated from the uterus and was nourished by adhesions to the omentum and mesentery and bowel. In that case there were places where the bowel was not attached right along to the tumor and left little apertures through which the intestine had become engaged and had become constricted, and death had resulted from peritonitis, so that you should remember if you have a movable tumor of the abdomen accompanied by symptoms

of obstruction it may be that the bowel has become adherent to it, and strangulation has taken place through apertures at points of adhesions of the bowel.

I recall sixteen cases where I have been called upon to operate for intestinal obstruction, and nine of them were caused by cancer.

In another case, to which I was called by Dr. F. W. Draper, I strongly suspected acute pancreatitis, about which Prof. Fitz had just written a most valuable monograph, and we sent for him at my suggestion; but neither of us had the courage of our convictions, and I obeyed the vote of the consultants, of whom I think there were seven, and opened the abdomen for supposed obstruction. As soon as we saw the fat necrosis in the omentum we saw our error, and I at once closed the wound.

As I said at the beginning, the question of diagnosis and the settling of it is the most important and the all-important thing to settle, and here comes in experience. An experienced physician and a learned diagnostician, with common sense in addition to his learning, is what is wanted. Why did I not operate on the case which turned out to be one from obstruction by an enterolith and why did I operate on the cases of cancer? Because experience from sad and happy cases guided me aright. It is with these cases as with cases of appendicitis; the man who has seen many can often tell when to operate and when not to, and yet he could not thoroughly and clearly explain to a student why he refrained from operating in one case and yet operated in another which probably seemed to the student almost similar. In many cases an exploratory laparotomy alone will settle the question. But an exploratory laparotomy in a person with distended intestines, and perhaps a slight amount of peritonitis, is very apt to be fatal if there is much handling of the bowels and difficulty of returning them, and they have to be stuffed back. Patients affected with abdominal cancer are peculiarly liable to be killed by an extensive laparotomy, though they bear the slighter colotomies very well.

I have seen patients go on for years with gradually increasing obstruction of the bowels, relieved at each attack by hypodermic injections of morphia, until finally complete obstruction has resulted, and at the autopsy I have found

CASES OF ABDOMINAL OPERATIONS ON ACCOUNT OF INTESTINAL OBSTRUCTION.

Disease.	Operation.	Cures.	Deaths.	Cases.
Cancer	Left lumbar colotomy . .	2	1	3
Cancer	Opening made in cæcum .		1	1
Cancer	Artificial anus in splenic region		1	1
Cancer	Artificial anus in sigmoid flexure (inguinal or pubic)	2	1	3
Cancer	Intestinal anastomosis . .		1	1
Pelvic inflammation after confinement causing complete obstruction	Left lumbar colotomy . .	1		1
Adhesive Tubercular Peritonitis	Left lumbar colotomy . .		1	1
Strangulation by Hernia, through intra-abdominal adhesions			1	1
Persistent omphalo-mesenteric remains	Artificial anus		1	1
Complete obstruction following intussusception and sloughing	Anastomosis by means of Senn's plates	1		1
Intestinal Band	Relieved by operation, but not cured		1	1
Intussusception in an infant	Relieved by operation . .		1	1
		6	10	16

Cases of cancer, 9; all others, 7.
Laparotomy done on account of false diagnosis, 1.
Cases of hernia are left out.

CASES OF OBSTRUCTION IN WHICH EARLY OPERATION WOULD HAVE BEEN PROPER.

Disease.	Fatal.	Autopsy made.
Volvulus	1	1
Obstruction by strangulation through bands of adhesion to a wandering fibroid uterine tumor	1	1
Round fibroid filling pelvic brim like a cup (34 years ago)	1	1

CASE OF OBSTRUCTION; OPERATION IMPROPER; RELIEVED WITHOUT OPERATION.

Caused by intestinal enterolith.	Passed spontaneously by rectum . .	1

Total number of my recorded cases 20

There are a number of other cases not operated on which I have seen in consultation, mostly cancer.

the intestinal wall above the obstruction as thick as the wall of the right ventricle of the heart. I have seen complete obstruction caused by a gradual compression of the rectum between a fibroid and the pelvic wall, in which the wall of the intestine above the point of compression was as thick as the wall of the left ventricle of the heart; and I have seen intestinal obstruction simulated by acute pancreatitis, by the irritation of an ovarian tumor, or an uterine tumor with a twisted pedicle. And it is only experience combined with common sense and anatomical and pathological knowledge that will enable a physician or a surgeon to pick out the different cases and say, "This is a case of so-and-so, and needs immediate operation; this is probably a case of temporary obstruction which will relieve itself; this case is not one of obstruction, but is one of simulated obstruction"; in short, to make the diagnosis, or if unable to make the diagnosis to say whether an exploratory operation should be done.

I have seen the abdomen opened for obstruction where there was not any; simply peritonitis; and I have myself opened it in a case of acute pancreatitis because the consultants advised it. It seems to me extremely difficult in these cases to make an accurate diagnosis of the cause of the obstruction, and in the majority of the cases in which I have opened the abdomen the obstruction, as I have said before, has been caused by malignant disease, and the places where the malignant strictures are more likely to occur, I should say, are the splenic flexure of the colon and the sigmoid flexure of the rectum. I have also seen it in the cæcum, but I think the former two places I have mentioned above the most common. If one is fortunate enough to find one of the traditional bands that can be divided and so set free the obstruction, he is very lucky.

It is interesting, I think, to see what takes place on the peritoneum of the exposed bowel. Supposing you do an inguinal colotomy, or any other colotomy for obstruction, and pull out the bowel and put your glass rod under and leave it. In the course of forty-eight hours that bowel is covered so thickly with what we call lymph that you would not recognize it for bowel. You would think it was mucous membrane when you take the dressing off and look at it. The deposit on it is a line or more in thickness. The intes-

tine adheres to the side of the wound as well as or better than if you had sewed it.

It is impossible unless a man is omniscient to know just what is the matter, but we can try to attain unto it. I went to Cambridge a year or more ago to see a case with Dr. Morrill Wyman. The patient was a gentleman sixty-four years old and had had complete obstruction of the bowels for some days. I could not make a diagnosis as to what was the matter with him exactly, and as it turned out no one could have done so, and yet my instinct was not to operate. I told Dr. Wyman that, not feeling sure of what I was going to accomplish, I should like to postpone the operation and have the patient carefully watched. This was a most exceptional case, and I do not know whether Dr. Wyman has ever published it. At any rate it is most unique, I should say. This gentleman went along, gradually becoming more comfortable, and, at the end of three or four weeks, passed a large stone through his rectum, similar to the stones which occur in cattle. The nucleus in horses and cows is generally a piece of iron or a nail, or something of that kind. I do not know what the nucleus of this was. The size of it was that of a large-sized plum, I believe,—a hard calcareous substance which completely obstructed the bowels. The patient has been well ever since. If I had operated and opened the bowel he would probably have died. I did not *know* absolutely whether to operate or not, but I knew enough to decide not to interfere. In this case I do not think anybody could have made the diagnosis. Our treatment turns largely on the question of diagnosis, and the diagnosis is made by human skill and not by divine skill, and we cannot be certain enough to know *always* what to do. I approve very strongly, in the majority of cases, of an exploratory operation, but one must be guided somewhat by the condition of the patient. Patients will often go three, four or five weeks with complete obstruction without distention. You see them with flat abdomens, and you see the intestines writhing in their vermicular motion, and the patients get along very comfortably for quite a long period. I think in these cases there is generally found some malignant stricture somewhere, to which the bowels have become gradually accustomed.

Dr. J. C. Irish, of Lowell:—The recorded cases of operation for acute intestinal obstruction are comparatively few; much less in number than in most other affections for the relief of which abdominal sections are done. Reports of individual operations would therefore seem still to be of some value. For this reason in part, and partly as an illustration of some details of treatment, I present the two following cases:

Miss S., age 32, Hudson, N. H., under the care of Dr. Wallace of Nashua, who favored me with the report which follows:

"For several weeks the patient had suffered from indigestion with obstinate constipation. December 3d the bowels were evacuated by the use of active cathartics. From this time no fæces or gas passed by the rectum until after the volvulus that existed had been relieved by operation.

December 6th Miss S. began to vomit at frequent intervals, being unable to retain any food. Her temperature was but slightly increased, reaching 99½, and her pulse somewhat accelerated. She did not at any time suffer from severe pain in the abdomen, nor were the bowels at all distended. The incessant vomiting, however, persisted in spite of all remedies.

I diagnosticated obstruction high up in the small intestine for the reason that the vomited matter, consisting largely of bile, at no time presented any fæcal odor. Castor oil, calomel, and croton oil, were administered in large doses, with frequent rectal injections, but failed to produce any movement of the bowels. This failure of treatment to obtain any action, together with the persistent vomiting, was the ground of diagnosis of acute intestinal obstruction.

The patient's condition from December 6th to December 16th remained practically unchanged, with the exception that she steadily lost strength and her pulse reached 120 per minute, and had become very feeble."

December 16th I saw the patient with Dr. Wallace for the first time. Her general condition showed extreme prostration. Examination of the abdomen revealed no distention; in fact the abdominal walls seemed somewhat retracted.

First, I commenced an incision through the median line

about four inches in length, introducing my hand within the abdominal cavity. I explored carefully the ilio-cæcal region but there was no evidence of any obstruction in this vicinity. I then extended the incision several inches above the umbilicus, opening to almost its entire extent the abdominal cavity. The large intestine contained a small amount of gas. The small one was absolutely flaccid and empty, a d its flattened surfaces presented a ribbon-like appearance. I immediately commenced to draw the small intestines outside of the abdomen, and as I proceeded and approached the orifice of the stomach, the intestine began to present a darkened hue—I was then certain I was approaching the seat of the obstruction. I drew out as much of the intestine as I easily could do, and introduced my hand in the neighborhood of the duodenum, expecting to find the obstruction by adhesions, but I could neither see nor feel anything unusual. All at once in the midst of these manipulations, the small intestine began to rapidly fill with air and became distended through its whole length in about one minute.

Now I really cannot positively affirm, by anything I saw or felt, the exact character of this obstruction; that is, what it was due to. Still I have no doubt it was a volvulus, although not absolutely demonstrated by my operation.

This patient went on to a rapid and uneventful recovery.

The other case to which reference has been made I operated upon for acute intestinal obstruction, July 24, 1885. This case has been reported and is now referred to simply with reference to certain details of the operation. This was an instance of acute obstruction by intussusception at the ilio-cæcum.

The intestines were extremely distended with gas, and no tumor could be felt by external examination. The diagnosis was established by failure of cathartics to induce any fæcal discharge.

A short incision was first made through the abdominal walls, but it proved to be entirely useless for all purposes of examination. The incision was then extended to nine inches in length, the bowels were withdrawn from the abdominal cavity, the obstruction at once found and corrected, and after a transverse division of the right rectus, the bowels were replaced. Before the rectus was divided it was impossible to return them to the abdominal cavity.

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In the treatment of obstruction by operation the length of the incision and its location I believe to be a matter of great importance. When the point of obstruction is indicated by a tumor that can be recognized by external manipulation, the incision should be made at that place in the abdominal walls. In the larger number of cases we have, however, no such precise indication of the locality of the lesion. Then a long median incision with immediate withdrawal of the intestines so far as possible from the abdominal cavity, facilitates the rapidity of the operation.

The short incision that has been so much advised only permits us to explore the abdominal cavity with our hand and not with our eyes. If we should be so fortunate as to find the obstruction, we would often be unable to correct it in the most careful manner, from lack of space and observation. While with the long incision and the bowels outside, the flaccidity of the distal portion of the intestines, and the distention of the proximal, would rapidly and unerringly guide us to the point of obstruction. In this way much handling of the intestines is avoided and the occlusion is often quickly relieved.

In both the desperate cases I have reported, the success, I think, was entirely due to the short time required for the operation.

When these patients come under the care of the surgeon they have suffered for a variable time from an affection that has greatly depressed their vital powers. They are often unable to endure the shock of any long-continued operation. Therefore, the long incision and immediate withdrawal of the intestines is recommended as a time-saving procedure. Any difficulty of replacing them is at once relieved by the division of one rectus, to which there cannot be the least objection.

Dr. J. C. Warren, of Boston:—It is my experience that obstruction by cancer is of the chronic type. We have a history of recurring obstruction: there are periods of constipation, vomiting and tympanites, which are followed by relief, and the patient may live a long time without an operation. Colotomy is a great relief to many cases of this class. In the rarer instances of acute obstructions the disease is usually far advanced, and little benefit is to be derived from an operation.

In regard to exploratory operations in cases of cancer, I think the abdomen can be opened without danger if unnecessary manipulation of the diseased tissue is avoided. There is a type of obstruction to which allusion can appropriately be made, as laparotomy is now often performed for its relief, and that is imperforate anus or rectum. It is well to remember in this connection that "paradox of M. Huguier" who states that the sigmoid flexure in infants is usually in the right iliac fossa. In point of fact the flexure is found in this position in only 20% of all cases.

Of the cases of acute intestinal obstruction of the class we are to discuss to-day, I have seen examples of volvulus, of intussusception and of obstruction by bands. I have selected but one case to report to-day, and present that on account of the unusual nature of the cause of the obstruction. The patient was a stout and strongly-built woman forty-five years of age, with a history of uterine disease of twelve years standing. She had been very much overworked as the agent of a charitable society, and her local pains had been more marked for several months previous to her attack. She entered the Massachusetts General Hospital Nov. 29, 1890, and was placed under the care of Dr. F. C. Shattuck, by whom she was eventually referred to me for operation. For about a week previous she had been confined to her bed suffering from nausea, and at times vomiting. She was thoroughly exhausted at the time of her entrance, and her temperature was subnormal. The temperature began, however, to rise steadily after the second day, as the symptoms of obstruction developed. No movement of the bowels was obtained beyond the removal of a small amount of fæcal matter from the rectum by enema. The amount of fluid that could be injected into the rectum was exceedingly small. The bowels became tympanitic on the third day, and on the following day the patient began to vomit. When seen by me on the fifth day the patient was lying with the knees drawn up, the abdomen greatly swollen, and was vomiting a thin, pale greenish, watery fluid. No nourishment was retained by mouth or rectum for three days. A slight improvement in the patient's condition made it advisable to wait until the seventh day from the time of the first rise of temperature. The pulse remained strong throughout; at the time of the operation it was 120.

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An incision was made from the umbilicus to the pubes, and the hand was introduced into the abdominal cavity. No band could be felt in either inguinal region, and as the distention of the intestines was very great it was decided to puncture the ascending colon which presented. An incision about one inch in length being made, a large amount of gas and fluid fæces was expelled, and the distention was so thoroughly relieved that an exploration in every direction could easily be made. The obstruction was found in the pelvis and was due to the constriction of the sigmoid flexure at the brim of the pelvis by bands of adhesions which filled a greater portion of the pelvis. So extensive were they that no attempt was made to break them up, and the opened intestine was stitched to the lower margin of the wound.

The patient made a slow recovery. Large quantities of fæcal matter continued to ooze from the artificial anus, and on the third day after the operation a movement occurred per rectum. The bowels continued to move occasionally the natural way, although the discharge from the artificial anus continued abundant for a long time. At the present time, eighteen months since the operation, the opening has contracted considerably and the discharges are restrained by a belt and pad which the patient wears. The movements from the rectum take place regularly. I have delayed closing the artificial opening partly because the patient experienced so little inconvenience from it and partly to allow the pelvic adhesions time in which to be absorbed. This form of obstruction is one not usually mentioned in the literature of the subject, but it is the second I have seen, the other, not in my own practice, terminating fatally without operation, and it seemed proper to call attention to it on this occasion.

I have had one case of acute obstruction from bands in the upper portion of the abdominal cavity, but the patient refused operation until it was too late. The distention of the intestines was great, but the autopsy showed that the seat of the constriction might readily have been reached had the bowels been emptied through a temporary opening.

The case of volvulus I operated upon has already been reported. The twist was high up in the small intestine, an unusual situation. The condition of the bowel was peculiar. The constricted loop was contracted, empty and gangrenous,

and the vessels were filled with clots. The gall bladder was filled with calculi and was partly surrounded by a collection of pus. The conditions which ordinarily produce a twist were evidently not present in this case.

DR. A. T. CABOT, of Boston:—The subject has been very thoroughly considered by the previous speakers, and I have but little to add to the discussion.

Before speaking on the general subject of the surgical aspect of intestinal obstruction, I wish to make one remark in the direction of diagnosis. Several gentlemen have spoken of volvulus, and Dr. Richardson mentions a special case of volvulus at which I happened to be present, and in which I could not satisfy myself that the condition was caused by a twist. I regarded the case as one of embolism or thrombosis of the mesenteric vessels. These vessels were found at autopsy filled with a clot and the coil of intestine supplied by them was deeply congested and stiff walled, but with no sharp line of demarcation between it and the neighboring intestine. This case, and one other which I saw at autopsy and in which the same condition of things existed, has made me doubt whether many of the cases considered at the time to be instances of volvulus, are not really cases of stoppage of the mesenteric vessels. I think this point worth noticing and bearing in mind when cases of this class appear.

Regarding the surgical treatment of intestinal obstruction, I entirely agree with Dr. Richardson in regard to the great importance of seeing these patients early, in order to accomplish anything by operation.

Most of the cases are very striking in character. The attack is sudden. A patient in perfect health is seized with what is evidently a serious condition in the abdomen, characterized by extreme pain and vomiting. Usually the onset is very different from an ordinary colic, but when it resembles this there is generally but little difficulty at the end of twenty-four hours in perceiving that something more serious has happened. If the intense pain and vomiting continue, it is evident that the sudden attack is dependent on some mechanical difficulty that has occurred within the abdomen; and ordinarily that mechanical difficulty can only be relieved by mechanical—that is surgical—means. Oc-

casionally nature sloughs off a piece of invaginated bowel; in a volvulus it is possible that it may sometimes untwist itself, but we cannot rely upon such accidental occurrences as a means of cure, and if we wait for such possibilities we shall lose a great many patients. I have often had occasion to regret operating too late, but have never operated too early.

My experience has mostly been in cases of internal strangulation behind bands. I have seen several such cases. In one the band ran from the mesentery to a hernial sac. In another case the band was the result of an adhesion due to an old salpingitis. In another case the band was due to the omphalo-mesenteric remains described by Dr. Fitz. In all of the cases the band was readily found, and could be easily corrected by operation.

If we operate early, when these patients have plenty of strength, they can stand the prolonged search which is sometimes necessary before the cause of obstruction is found. Operating late on a patient who is almost pulseless, we are more likely to be compelled to make an incomplete operation or to find gangrenous conditions which cannot be corrected.

In answer to questions, Dr. Cabot said: It is very hard for me to understand how a loose coil of intestine should so twist itself as to cause strangulation, without some mechanical attachment which should prevent the coil from untwisting. In Dr. Richardson's case, to which I have alluded, it seemed to me that the other coils which were distended with tympanites were quite as much twisted upon themselves as that one which was congested and approaching a gangrenous condition.

Dr. Homans:—I should like to say one word about the plugging of the vessels of the intestines and mesentery in a case of volvulus. Any twist, or volvulus, if sufficiently tight and long enough persistent, causes a plugging of all the vessels in the twisted part and also for a certain distance on either side of the twist. You see this in the ovarian or uterine tumor with a twisted pedicle; you see this follow the torsion of an artery. This twist, or volvulus, stops the circulation, and coagulation is the necessary result, followed by sloughing of the bowel. It seems to me more probable

that the volvulus causes the plugging of the vessels rather than that the plugging of the vessels causes the volvulus.

DR. WARREN :—The condition Dr. Cabot has alluded to is similar to that found in my case of volvulus. There was complete plugging of the large vessels on the proximal side of the twist, which suggested thrombosis or embolism. The collapsed condition of the bowel and the peculiar rigidity of the parts are peculiarities not seen in strangulated hernia or bowels constricted in other ways.

The usual seat of volvulus is in the lower portion of the ilium and the sigmoid flexure. It is a curious fact, mentioned by Kœnig, that the affection is more frequent in certain countries, as for instance Russia, where the length of the small intestine, owing perhaps to the peculiar vegetable diet, is said to be much greater than that of other nations. The stem of each loop will consequently be narrow, or the peripheral portion of the mesentery will be unusually wide, and abnormal movements of the intestine may under these circumstances give rise to a twist. Volvulus of the lower ilium or sigmoid flexure may give rise to knots formed by an intertwining of these two loops.

ARTICLE XXVI.

THE TREATMENT OF COMPOUND FRACTURES BY MODERN METHODS.

BY

HERBERT L. BURRELL, M.D.

AND

EDWIN W. DWIGHT, M.D.

OF BOSTON.

READ JUNE 8, 1892.

THE TREATMENT OF COMPOUND FRACTURES BY MODERN METHODS.

DURING the past few years the treatment of compound fractures has undergone radical changes and marked improvement. In this paper we shall confine ourselves to a consideration of the treatment of fractures of the thigh, leg, arm and fore-arm. The improvement in the results has been brought about by two causes.

(1) Thorough exploration and cleansing of the wound, and antisepsis.

(2) By the recognition of the importance of the physiological principle of complete rest to a fractured bone.

It is of passing interest to consider what results were obtained in the treatment of compound fractures by the older methods. In Guy's Hospital from 1841 to 1861, twenty years, there was a mortality of about 28%; in the Pennsylvania Hospital from 1839 to 1851, twelve years, there was a mortality of 44%; in the New York Hospital during a similar period there was a mortality of 48%; in the Obuchow Hospital Report of St. Petersburg there was a mortality of 68%.[1]

Under modern methods Dennis reports one thousand cases of compound fractures, and after removing from consideration such cases as he feels justified in eliminating, he

[1] These statistics are quoted from Dennis's paper on the treatment of compound fractures of one thousand cases. Med. News, April 19, 1890, p. 416,? and his analysis of 516 compound fractures, Med. News, November 13, 1886, p. 533.

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has remaining 681 cases of compound fractures, with one death from sepsis, giving a death rate of 1-7 of 1%.

In the mortality there has been such a noticeable decrease that it demands careful attention. It will be of interest to consider the subject of compound fractures from the following standpoints:

(1) The class of case that can be saved with a useful leg, and the class of case that requires amputation.

(2) The detail of "putting up" a compound fracture.

(3) The management of a compound fracture.

(4) The prognosis.

The class of cases that can be saved with a useful leg, and the class of case that requires amputation.

A primary amputation for a compound fracture at the Boston City Hospital is extremely rare; a few years ago it was common. Limbs which would formerly have been unhesitatingly removed are now saved. To define precisely what should govern one in the amputation of a leg is extremely difficult; but we take into consideration the following factors:

a. The age of the patient. Old age by no means indicates amputation.

b. The physicial condition of the patient in regard to alcoholism, renal trouble, etc.

c. The patient's environment.

d. The attention that he will receive in the after-treatment of his case.

e. The facilities for "putting up" his leg antiseptically and in plaster.

f. The condition of the soft parts, bones, arteries, veins and nerves.

Extremely extensive crushing of the soft parts in a young person does not mean that amputation is necessary; obliteration of the main vessel or vessels in a limb demands amputation. It must be remembered that frequently swelling

prevents the surgeon from feeling the pulsation in the anterior and posterior tibial arteries, and it is only when they are known to be obliterated that amputation is resorted to. In short, we try to save everything, and resort to a secondary amputation if necessary. One's personal judgment must be applied in each case in deciding what to do. Given an old man in very feeble health, with extensive crushing of the soft parts and great destruction of the bone, even if the vessels pulsate it might be more judicious to amputate than to attempt to save the limb. Yet a man aged 75, case 101, with a compound comminuted fracture, without extensive crushing of his limb, had both life and limb saved.

Details of "putting up" a compound fracture:—

In the first place, let us say that as much care is taken in the treatment of compound fractures with small openings as in cases where there is extensive crushing of the soft parts; and in several instances where this principle has been disregarded, and the small opening sealed up without properly exploring and cleansing the wound, unsatisfactory results have occurred.

We can divide compound fractures into three classes so far as the detail of "putting up" is concerned.

(1) Where there has been simply a puncture of the skin by a protruding fragment of bone, or a clean incised wound down to the bone.

(2) Where there is associated with a compound fracture a protrusion of the fragments; considerable destruction of the soft parts; and contamination by dirt.

(3) Where the injury is so severe that it is a question whether to amputate or not.

In all these cases the following preparations should be made: A large bucket of hot corrosive sublimate, 1-2000, is made up; a fountain syringe is filled and hung up; beneath the limb is placed a folded rubber sheet which leads

into a bucket beneath the table or bed; and the following clean instruments are sterilized: a knife, a pair of scissors, a few artery pressure forceps, a curette, a probe, a pair of anatomical forceps, a small pair of bone forceps, and a strong pair of forceps to detach any loose fragments of bone. Sterilized silk, catgut, and needles should be at hand. In all compound fractures we prefer to anæsthetize the patient, that the cleansing may be complete.

In the first class of case, where there has been simply a puncture of the skin by a protruding fragment, or a clean incised wound down to the bone, the limb should be cleansed with soap and water and shaved, and after washing with ether to remove any fatty substances, surrounded with sterilized towels saturated with a 1-2000 solution of corrosive sublimate to prevent contamination from surrounding objects. The wound should then be douched with corrosive sublimate solution, and the fracture reduced. If there is any dirt on the edges of the wound, or they are crushed, the dirt or the skin about the opening should be removed. The wound may then be sutured and dressed, and the fracture is practically a simple one.

When, however, as in the second class of case, there is protrusion of the bones or contamination of the wound by dirt, the patient should always be etherized, and the wound washed, shaved, and cleansed vigorously. We lay open all cavities and freely expose any pockets that may exist; remove all completely detached fragments of bone, unless they are very large or adherent to the periosteum, when we allow them to stay in position; snip off any devitalized tissue; replace the bones in position; and suture the overlying soft parts without drainage. It is very exceptional at the present time to use drainage tubes. The statistics in tables one and three of cases treated with tubes show that both the immediate and ultimate results are not as good as when the cases are treated antiseptically with plaster. This

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statistical difference is not due to the severity of cases treated with tubes, for many of them were not severe cases. It has seemed that the difference was due to the necessity of removing the tubes early, and the consequent disturbance of the fracture.

The dressing in all these fractures is baked gauze, the inner layers of which are saturated with a 1-2000 solution of corrosive sublimate; then a light circular plaster of Paris bandage is applied in a manner which will be described later.

Where there is difficulty in maintaining the position of the fragments of bone, in a number of instances we have divided the tendo-Achillis with great benefit. This simple procedure allows a backward or a lateral displacement to be easily overcome.

In the third class of cases, where the fracture is so severe that amputation may be necessary, the same care is taken in "putting up" the fracture, but a fixed dressing of plaster of Paris is not always used. Dr. W. P. Bolles's fracture box, Smith's anterior splint, or a pillow adjusted to the limb with side splints may be used until the fate of the limb is determined.

Compound fractures, after the application of the antiseptic dressing, have been put in plaster of Paris, or immobilized by some other means. Table one (1), Treatment and Immediate Results, is interesting in this connection. At present the drift of work is towards the almost exclusive use of plaster of Paris as a fixation dressing.

Within the past few years the application of plaster of Paris bandages has greatly improved. The objections to the use of plaster of Paris formerly were, its thickness and weight, the slowness of its "setting," and the difficulty of its removal. All these difficulties have been largely overcome. We now use bandages of washed crinoline. Washing removes the sizing from the crinoline, which would hinder the "setting" of the plaster of Paris. They are five

yards in length and four or five inches in width, and are rolled evenly and should be made up with fresh plaster.[1]

Plaster of Paris bandages, unless they are freshly rolled, rapidly deteriorate by the absorption of moisture. To overcome this difficulty, and to render its use more feasible for the general practitioner, we have taken long circular tin cans of the following dimensions: three and a quarter inches in diameter, and nine and a half inches in length. Into one of these tin cans can be packed a sufficient number of plaster of Paris bandages for the "putting up" of a compound fracture of the leg. In the can, besides the plaster of Paris bandages, should be placed a quantity of loose plaster of Paris, and three strips of tin nine inches long and a half inch wide, which can be used for re-enforcing the plaster if necessary. A quantity of these cans may be prepared at one time by the practitioner, the covers sealed on by paraffine, which renders them impervious to moisture, and the cans may be wound with sheet wadding, which will serve to act as a protectant to the limb. The whole may then be enclosed in paper and tied up, and can be put on the practitioner's shelves in his office, and will always be ready for emergency use. One of these cans can be unsealed, and the plaster of Paris bandage immersed in warm water without salt. We have found that salt renders the plaster brittle, and does not materially hasten its "setting."

If we use washed crinoline bandages, the bandage is then applied over the sheet wadding which has been wrapped about the leg. In case it is difficult to hold the upper fragment in its proper position the plaster bandage is put on below and above the fracture, and then the two are joined, while the surgeon's thumb holds the fragment in position until the plaster sets. In all cases where the fracture of the leg is above the junction of the lower and middle

[1] Plaster of Paris may be obtained of Curtis & Co., cor. Albany Street and Chester Park, Boston, at $2 per barrel.

third of the limb, the plaster should be extended to and above the knee in order to immobilize the gastrocnemius. Usually after "putting up" a compound fracture in the foregoing manner, if there is any pain within the first twenty-four hours, we swing the leg by means of a Smith's anterior splint, or some similar device. Swinging fractures after "putting them up" in plaster of Paris relieves the pain, and saves the administration of morphia. (Case 113 illustrates this point).

The management of a compound fracture:—

In applying the primary dressing the practitioner should exercise as great care as if the ultimate fate of the limb depended solely on the dressing, and this was the case in many instances three years ago. At that time fractures were put in plaster of Paris, and at the end of a month or six weeks the plaster was removed, and union by first intention, without a drop of pus and perfect results in the union of bone, was the rule. But exceptionally on removing the plaster of Paris bandage a limb bathed in pus, or an extensive slough,[1] or a crooked limb, was discovered. This has led us personally to be more cautious, and the rule which we have adopted in reference to changing the plaster of Paris bandage is somewhat as follows: That unless the surgeon is absolutely sure that the fragments are in perfect position, not over two weeks should elapse without changing the plaster of Paris dressing; and that even if he is perfectly sure it is best at the end of a fortnight to change the plaster and renew the dressing; for very exceptionally he will find a collection of pus without there having been a rise in temperature, a slough (aseptic) without external evidence, and worst of all a bowing backwards of the tibia and fibula, which, when united, is with great difficulty overcome.

[1] Vide case 119. It is a question whether this case was not due to pressure of a plaster of Paris bandage.

The rule which we have pursued is to change the plaster on the seventh day; and to change the plaster again at the end of the fifteenth or seventeenth day when union in the bone is beginning; and at this time we put on a plaster of Paris bandage which will remain until the bone is completely united. This may seem laborious. It would have been so with a plaster of Paris bandage as they were formerly applied; but it is not so with light circular plasters which can be divided easily and quickly in the median line in front by the method proposed by Dr. Goldthwaite, which is as follows:

A sharp-pointed knife scores the bandage from top to bottom. A little water from a medicine dropper is allowed to run in this groove. This softens the plaster, and by means of the knife and the medicine dropper filled with water an ordinary plaster of Paris bandage can be removed in from two to three minutes, and in five minutes more a fresh plaster of Paris bandage, consisting of two bandages for the leg, and three, or at the most four, when the plaster extends to the middle of the thigh, can be re-applied. This is quite different from the method of sawing the plaster of Paris bandages, which frequently occupied twenty minutes to half an hour. This application of light plaster of Paris bandages, and their easy removal, is, to our minds, a very important point in the management of compound fractures, as it enables the surgeon at any time to see what is going on inside the dressing.

We rarely if ever re-apply a cut up plaster after it is entirely removed from the limb. Greater security is afforded the limb by the application of a new and complete circular plaster of Paris bandage. A rise in temperature and pain in the limb still remain the cardinal reasons for the removal of a plaster of Paris bandage. We disregard a rise in temperature to 100 or 101 for the first three or four days; but after the first forty-eight hours severe or constant pain

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CASES OF COMPOUND FRACTURE TREATED BY "MODE

CASE.	AGE.	HOW INJURY OCCURRED.	CHARACTER OF INJURY.	PREVIOUS TREATM'T.	HOW TREATED.	MA
1	39	Direct violence (timber).	B. b. of leg, wound ¼ inch long, oblique fracture, no comminution.	None.	C. S. 1-2000. Antiseptic and plaster.	Went out o. r. on 7 ture,
2	30	Fell on the street.	Fr. of radius, and co. di-location of ulna.	None.	Antiseptic and anterior Bolles splint.	Dressed on 5th da cle
3	18	Caught in chain of "winch."	Compound comminuted fr. of humerus into elbow-joint, with considerable laceration.	None.	Excision (partial), C. S. dressing with straight splint.	Dressing n
4	24	Sliding on "double runner," ran into tree.	Co com. fr. of b. b. of leg, with much laceration of tarsus, and probable rupture of post tibial.	Ext. mal. dressed and reduced.	Resection of b. b. C. S. dressing, with tube and posterior wire splint.	Dressed 5th day, tu sl. discharge; disch
5	60	Run over by team aft. drinking.	Co. com. fr. b. b. of leg, with small opening.	None.	C. S. 1-1000. Antiseptic and plaster.	Dressed 14th day, c
6	40	Fell 6 ft. on a plank driveway.	Co. fr. and disloc. at ankle, with sl. laceration.	None.	Antiseptic and plaster.	Dres'd 14th day, ve
7	26	Fell from staging and covered with debris.	Co. com. fr. of patella, scalp wound, shock, etc	None.	Temporary dressed; next day, antiseptic, tube wire and plaster.	Dressed 14th day, t next dressi
8	ch 14	Buried under falling building.	Doub. co. com. fr. tibia, with multiple injuries.	None.	Antiseptic and plaster.	Only lived
9	34	Fell with staging about 35 ft.	Co. fr. of femur, small opening.	None.	Antis. with tube, coaptation T and exten.	Dressing not ch
10	7	Fall and struck with board.	Co. fr. of tibia, with considerable laceration.	None.	Antiseptic and (?)	Dressed 5th day, d
11	48	Slipped and struck knee on door steps.	Lac. w'd, 4½ inches; b. 2 inches above patella; fr. 4 inches above patella.	None.	Carbolic 1-20, tube, counter-opening, ham-splint and extension.	Dressed 6th day, d
12	30	Staging gave way, fell 35 ft., unconscious.	Co. fr. b. b. above middle; co. fr. of internal malleolar.	None.	Antiseptic and fracture box.	Dressed 2d 104
13	42	44 hours before entrance, crush. by stone team 3 tons.	Severe lac. wd. above ankle; co. com. fr. of b. b. of leg, with blebs.	Exc. cloths.	Tibia wired, antiseptic and plaster.	Dressed 9th day, dischar
14	9	Fell from tree, 15 ft.	Co. com. fr. of femur; lac. wd., venous hæmorrhage; shock.	None.	Fragment removed, antisep., tube, coaptation, ham-splint and extension.	Dressed 10th day,
15	29	Fell down stairs, 12 ft.	Co. fr. of b. b. of arm, ulnar projecting.	None.	Antiseptic and (?)	Dressed 3d day, cl 31 da
16	33	Fell from roof, 29 ft.	Co. fr. of l. olecranon, joint open.	None.	Wired, put up straight, antiseptic and ant. splint	Disch. 3d day agai
17	48	Beer team over leg.	Co. com. fr. b. b. of leg, r.; cut 2½ inches long.	None.	Count.-openings, C. S. 1-1000, antis., bone rem., iodoform boracic gauge and plaster.	Dressed 1st day, oo
18	53	Fell from load of hay on cobble stones.	Lac. wound tip; co. fr. of olecranon.	Temporary dressing.	Antiseptic, int. angular splint.	Dressed 2d day, cl
19	28	Thrown from team.	Co. disloc. of ankle; int mal. bone protrude; laceration.	None.	Antiseptic, iodoform boracic plaster.	Dressed 24th day, aga
20	29	Caught in rope on ship board.	Co. fr. b. b. of leg, laceration, bone protruding, hæmorrhage.	None.	Antiseptic, iodoform boracic plaster.	Dressed 3d day, bleb dead bon
21	28	Horse kick.	Co. com. fr. b. b. of leg, small opening, emphysema, oblique.	None.	Antiseptic, iodoform, boracic plaster.	Dressed 27th day, cl
22	45	Fell from shed 8 feet.	Co. fr. b. b. of arm, middle, small opening.	None.	Antiseptic, iodoform, boracic; int. ang. splint.	Dressed 2d day, 17th day bone
23	33	Alcohol, fell and walked ½ mile.	Co. Potts fr. of leg, bone projec., wd. 2½ inches.	None.	Tip of bone removed; antiseptic; iodoform and boracic plaster.	Dressed 20th day, motion i
24	10	Horse car over l. arm at elbow.	Co. com. fr. of elbow.	None.	Excision, tube, antis. & straight splint.	Dressed 5th day,
25	11	Fell off fence 10 ft., struck rock.	Co. com. fr. of humerus, exter. angle; com. fr. of olecranon.	None.	Fragment removed, antiseptic, iodoform and boracic, int. ang. splint.	Dressed 27th day,
26	16	Fell from team.	Co. fr. of fibula.	None.	Antiseptic, plaster.	Dressed 8th
27	52	Fell in street, turning foot under.	Co. fr. b. b. of leg, some laceration.	None.	Antiseptic and plaster.	Dressed 11th
28	30	Fell from street car.	Co. com. fr. of tarsus into joint, much lacerated.	None.	Antiseptic, tube, iodoform.	Dressed 1st day, cle dis
29	57	Fell on floor.	Co. fr. of humerus into joint (?).	None.	Antiseptic and int. ang. splint.	Dressed 11th day, cl
30	14	Shed fell on him.	Co. com. fr. of femur, with much laceration.	None.	Antiseptic, tube and plaster.	Dressed 6th day, cl
31	7	Run over by horse car.	Co. com. fr. of fibula, with co. fr. of foot, lac'd.	None.	Antiseptic and tubes.	Died in collapse af
32	10	R. R. car wheel went over foot.	Co. fr. of astragalus, with great laceration.	None.	Antiseptic, tube.	Dressed 3d day,
33	37	Fell from step-ladder 10-12 feet.	Co. com. fr. of os calcis, with laceration.	None.	Antiseptic	

Management of Case.	Complications.	Union.	When Bore Weight on Leg.	Ultimate Result.
on 7th day, plaster not cut, no tempera-ire, to be attended at home.	Probably muscular fibre between fragments.	Delayed.	7 months.	Excellent.
h day, dressing having soaked through, clean and doing well.		"Progressing well" on 25th day when discharged.		
g not changed, died the 4th day.	Fat emboli. Dead.			Dead.
, tube out 6th day, healing with sinus, disch. on 86th day, bearing some weight on foot.	Cystitis, some retention of urine, and some sloughing, with œdema below fracture, and sl. am't of pain.			
ay, clean, small am't of pus on 20th day.	Some delirium.	Fairly firm on 60th day when disch.		
, very sl. pus on one side, small slough.	Small slough and very sl. pus.			Excellent, perfect motion, practically is as good as the other.
ay, tube removed, moderate amt. of pus, essing 21st day; disch. 91st day.	Multiple injuries, shock, sl't pus.			Excellent as reported.
ved a few hours; died of shock.	Multiple injuries. Dead.			Dead.
ot changed, D. T.: died the 8th day,	Delirium tremens. Dead.			Dead.
day, slough, clean, daily dressing until disch. on 88th day.	Diabetes mellitus, sloughing.	Firm on 88th day.	118th day went to sch. with crutches.	Excellent, no deformity, good position, walks without limp.
ay, clean; 8th t. normal; disch. 124th day; good union.	Diarrhœa, delirium tremens.	Good union.		
d 2d day, some pus; discharged 104th day, small sinus.	32 d. sinus, slough; 44 d., necrosis of tibia and artery, operated.	Fair union.		
ay, clean: 33d day, bowing corrected; charged 95th day, bowing.		Good.	1 year.	Useful in Dec. '91, excellent.
day, clean, t. normal: died of diphth.	Diphtheria 52d day.			Dead.
, clean, dressed 11th day, pus, healed 31 days; disch. 31st day.	Pain.	Fair on 31st day.		
against advice, dressing not changed.				
, oozing, 9th day clean, open dressing: disch. 123d day.	Oozing.	Fair on 121st day.		
y, clean, 9th day pus; disch. 16th day. R. angle splint.		Good 16th day.		
day, clean, t. normal 6th day; disch. against advice, 27th day.			117 days.	Position excel't, motion good, inability on act. pain in instep when he bears wt. on leg.
blebs, t. high, small quantity gangrene, bone, pus; disch. 171st day.	Gangrene of toes 5th day, slough, pain, amp. of toes.			
ay, clean, with bowing; disch. 60th day.	Delirium.	Fair 60th day.		
17th day barebone, daily dressing, 60th bone removed; disch. 73d day.	Necrosis of bone (ulnar), contraction of fingers.	Good 60th day.		
day, linear granulation; 27th day some ion in joint; disch. 133d day.			120 days.	Excellent.
day, clean, 40 days arm 30 degrees.				Excellent, slt. flail-like motion, but perfect motion and very useful arm.
day, clean, sl. motion, disch. 43d day.		Good 43d day.		
8th day, clean; disch. 26th day.				
11th day, clean; disch. 44th day.		Firm 44th day.		
y, clean; dressed 7th day, slough, pus: discharged 71st day.	Slough, pus, alcohol, deformity.		1 yr. aft. leav. hosp. worked in 13 mos.	Considerable motion in joint, works as iron moulder with very little trouble, excellent.
y, clean; disch. 21st day, against advice.				
y, clean, later sl. pus; disch. 90th day.	Great deal of pain and considerable temperature.	Firm 65th day.	6 months.	Remarkably good, small callus, walks without limp, no pain, perfectly good leg.
se after rallying from ether, 14 hours.	Died 14 hours.			Dead.
l day, slough, amputation advised; disch. 92d day.	Slough, necrosis, grafted.		11 months; 13 mo. school,	Perfect motion, solid union, slightly painful cicatrix on sole of foot.

15	29	Fell down stairs, 12 ft.	Co. fr. of b. b. of arm, ulnar projecting.	None.	Antiseptic and (?)	Dressed 3d da
16	33	Fell from roof, 29 ft.	Co. fr. of l. olecranon, joint open.	None.	Wired, put up straight, antiseptic and ant. splint	Disch. 3d day
17	48	Beer team over leg.	Co. com. fr. b. b. of leg, r.; cut 2½ inches long.	None.	Count.-openings, C. S. 1-1000, antis., bone rem., iodoform boracic gauge and plaster.	Dressed 1st day
18	53	Fell from load of hay on cobble stones.	Lac. wound tip; co. fr. of olecranon.	Temporary dressing.	Antiseptic, int. angular splint.	Dressed 2d da
19	28	Thrown from team.	Co. disloc. of ankle; int mal. bone protrude; laceration.	None.	Antiseptic, iodoform boracic plaster.	Dressed 24th
20	29	Caught in rope on ship board.	Co. fr. b. b. of leg, laceration, bone protruding, hæmorrhage.	None.	Antiseptic, iodoform boracic plaster.	Dressed 3d day, dead
21	28	Horse kick.	Co. com. fr. b. b. of leg, small opening, emphysema, oblique.	None.	Antiseptic, iodoform, boracic plaster.	Dressed 27th da
22	45	Fell from shed 8 feet.	Co. fr. b. b. of arm, middle, small opening.	None.	Antiseptic, iodoform, boracic; int. ang. splint.	Dressed 2d day, day b
23	33	Alcohol, fell and walked ½ mile.	Co. Potts fr. of leg, bone projec., wd. 2½ inches.	None.	Tip of bone removed; antiseptic; iodoform and boracic plaster.	Dressed 20th d moti
24	10	Horse car over l. arm at elbow.	Co. com. fr. of elbow.	None.	Excision, tube, antis. & straight splint.	Dressed 5th
25	11	Fell off fence 10 ft., struck rock.	Co. com. fr. of humerus, exter. angle; com. fr. of olecranon.	None.	Fragment removed, antiseptic, iodoform and boracic, int. ang. splint.	Dressed 27th
26	16	Fell from team.	Co. fr. of fibula.	None.	Antiseptic, plaster.	Dressed
27	52	Fell in street turning foot under.	Co. fr. b. b. of leg, some laceration.	None.	Antiseptic and plaster.	Dressed
28	30	Fell from street car.	Co. com. fr. of tarsus into joint, much lacerated.	None.	Antiseptic, tube, iodoform.	Dressed 1st day
29	57	Fell on floor.	Co. fr. of humerus into joint (?).	None.	Antiseptic and int. ang. splint.	Dressed 11th day
30	14	Shed fell on him.	Co. com. fr. of femur, with much laceration.	None.	Antiseptic, tube and plaster.	Dressed 6th day
31	7	Run over by horse car.	Co. com. fr. of fibula, with co. fr. of foot, lac'd.	None.	Antiseptic and tubes.	Died in collaps
32	10	R. R. car wheel went over foot.	Co. fr. of astragalus, with great laceration.	None.	Antiseptic, tube.	Dressed 3d
33	37	Fell from step-ladder 10-12 feet.	Co. com. fr. of os calcis, with laceration.	None.	Antiseptic and plaster, ext. planter, artery tied.	Dressed 11th
34	38	Fell from hay mow 10 feet.	Co. com. fr. of humerus into joint.	Temporary dressing.	Antiseptic, iodoform, Int. ang. splint.	Dressed 4th da
35	45	Fell 26 ft., struck on feet on brick sidewalk.	Co. com. fr. b. b. of leg; simple fr. of b. b. of other leg.	None.	Antiseptic and plaster.	Dressed 2
36	30	Fell off horse car.	Co. fr. of ulnar, ruptured tendon and muscles.	None.	Antiseptic and iodoform and splints.	Dressed
37	47	Fell down stairs.	Co. fr. of b. b. of arm at wrist, joint opened.	None.	Antiseptic and splints.	Dressed 1
38	45	Fell down steps.	Co. com. fr. b. b. of arm into wrist joint; T fr. into elbow.	None.	Antiseptic and splints.	Dressed 3
39	24	Kicked by horse.	Co. fr. of tibia; r. leg.	Vessels tied by outside Dr.	Antiseptic, blankets and side splints.	Dressed 2d day,
40	23	Struck by falling timber.	Co fr. b. b. of leg.	None.	Antiseptic, iodoform blankets, and side splint.	Dressed 2d
41	19	Fell down elevator well, drunk.	Co. fr. of b. b. of arm, small opening.	None.	Antiseptic and ant. splint.	Dressed 5th d pad
42	9	Run over by wagon.	Co. com. of b. b. of leg, sl. laceration.	None.	Antiseptic, post. wire splint, side splints.	Dressed 13th da
43	22	Thrown fr. wagon and dragged.	Co. com. fr. of elbow joint, edges crushed, lac.	None.	Fragments removed, antis. iodof. splints.	Dressed 4th day
44	52	Crushed in machinery.	Co. com. fr. of b. b. of leg, laceration, dirty.	None.	Antiseptic, iodoform, plaster.	Dressed 7th
45	34	Thrown fr. team and dragged.	Co. com. fr. b. b. of leg; disloc. of ankle; dirt.	None.	Fragments removed, antiseptic, iodoform and plaster.	Dressed 11t
46	21	Fell on bricks 14 ft. landed on ft.	Co. fr. b. b. of leg, with laceration.	None.	Antiseptic, tube, plaster.	Dressed 2d d., cle
47	24	Run over by horse car.	Co. com. fr. b. b. of leg, into joint, rupt. tendon.	None.	Antiseptic, iodoform, plaster.	Dressed 4th day
48	15	Between rope and capstan.	Co. fr. b. b. of leg, laceration.	None.	Antiseptic, iodoform, plaster.	Dressed 18th day bare bone; dr. 7s
49	42	Kick by horse.	Co. fr. b. b. of leg.	None.	Antiseptic, iodoform, plaster.	Dressed 30th
50	33	Fell from window, drunk.	Co. com. fr. of fibula.	None.	Hydranopthal, antiseptic and plaster.	Dressed 18th
51	31	Jumped a vaulting pole and struck in sand.	Co. fr. b. b. of leg into joint.	None.	Antiseptic and plaster.	Dressed 3d day, c
52	35	Fell and struck on gravel with knee flexed.	Co. fr. of patella, 1½ in. separation.	None.	Hydranopthal, antiseptic, Malgaine-hooks tube.	Dressed 7th day
53	46	Run over by large team.	Co. com. fr. b. b. of leg into ankle joint. (bag of bones.)	None.	Antiseptic, plaster.	Dressed 20th day heal
54	22	Fell from telegraph pole, 20 ft.	Co. com. fr. b. b. of leg [illegible]	None.	[illegible]	

l day, clean, dressed 11th day, pus, healed 31 days; disch. 31st day.	Pain.	Fair on 31st day.		
day against advice, dressing not changed.				
day, oozing, 9th day clean, open dressing: disch. 123d day.	Oozing.	Fair on 121st day.		
l day, clean, 9th day pus; disch. 16th day. R. angle splint.		Good 16th day.		
4th day, clean, t. normal 6th day; disch. against advice, 27th day.			117 days.	Position excel't, motion good, inability on act. pain in instep when he bears wt. on leg.
lay, blebs, t. high, small quantity gangrene, ead bone, pus; disch. 171st day.	Gangrene of toes 5th day, slough, pain, amp. of toes.			
h day, clean, with bowing; disch. 60th day.	Delirium.	Fair 60th day.		
lay, 17th day barebone, daily dressing, 60th ay bone removed; disch. 73d day.	Necrosis of bone (ulnar), contraction of fingers.	Good 60th day.		
th day, linear granulation; 27th day some notion in joint; disch. 133d day.			120 days.	Excellent.
5th day, clean, 40 days arm 30 degrees.				Excellent, slt. flail-like motion, but perfect motion and very useful arm.
7th day, clean, sl. motion, disch. 43d day.		Good 43d day.		
sed 8th day, clean; disch. 26th day.				
sed 11th day, clean; disch. 44th day.		Firm 44th day.		
day, clean; dressed 7th day, slough, pus: discharged 71st day.	Slough, pus, alcohol, deformity.		1 yr. aft. leav. hosp. worked in 13 mos.	Considerable motion in joint, works as iron moulder with very little trouble, excellent.
n day, clean; disch. 21st day, against advice.				
n day, clean, later sl. pus; disch. 90th day.	Great deal of pain and considerable temperature.	Firm 65th day.	6 months.	Remarkably good, small callus, walks without limp, no pain, perfectly good leg.
llapse after rallying from ether, 14 hours.	Died 14 hours.			Dead.
l 3d day, slough, amputation advised; disch. 92d day.	Slough, necrosis, grafted.		11 months; 13 mo. school.	Perfect motion, solid union, slightly painful cicatrix on sole of foot, excellent.
11th day. slough, clean; disch. 82d day.	Slough.			
h day, clean, later sl. pus, poor position: disch. 40th day.	Old injury of same elbow, sl. pus.	Good 36th day.		
sed 24th day, clean; disch. 69th day.	Simple fr. b. b. of other leg.		7 months.	Sl. motion, large callus, some deformity and some inability, fair result.
ssed 3d day, clean; disch. 24th day.	Rupture of tendons and muscle.			
sed 14th day, clean; disch. 16th day.			Worked with arm 6 mos. after disch.	Good motion and grip, sl. deformity, excel.
sed 30th day, clean; disch. 68th day.	Simple com. T fr. of humerus into elbow.	Delayed.		
day, clean, fract. box 12th day, healed 19th day, disch. 38th day.		Firm 38th day.		
ed 2d day, clear, discharged 75th day.		Fair 25th day.		
5th day, clean; dressed 23d day, bowing, padded, etc.; disch. 31st day.		Good 31st day.		
th day, pus, deformity; healed 17th day; discharged 44th day.	Slight pus.	Good 44th day.	Without crutches after 58th day.	Excellent, very slight thickening, no deformity, slight rheumatic pain, otherwise as good as the other.
n day, superficial pus, granulating surface; discharged 50th day.	Slight pus.			
d 7th day, clean; discharged 74th day.		Good 65th day.	65 days.	
d 11th day, clean; discharged 52d day.	Pneumonia. fragment of bone in joint preventing reduction until removed; simple fr. of other leg.			
L., clean; dressed 10th d., blood clots, pain; discharged 54th day.		35 d. fair; 54 d. fair.		
n day, some slough; discharged 104th day.	Slough.	Fair 90th day.		
n day, clean, sl. pus on surface; dr. 60th d., dr. 78 d., granulating sinus; disch. 107th d.	Slight pus, necrosis.		107 days.	
l 30th day, clean; discharged 49th day.		Some 30 d. Good 49 d		
l 18th day, clean; discharged 57th day.	Del. trem. and chronic alcoholism.	Good 57th day.	57 days.	
lay, clean; dressed 37th day, bone removed; discharged 50th day.	Alcoholic, necrosis, delirium tremens interfered with apparatus.	Good 69th day.	360 days.	Excellent, good position, slight "stiffness" in ankle.
h day, clean, slough; died 14th day, clean.	Delirium tremens, slough, double pneumonia. Dead.			Dead.
n day, slough, bare bone; dressed 46th day, healed: discharged 68th day.	Pneumonia, slough.	Good 68th day.		

39	24	Kicked by horse.	Co. fr. of tibia; r. leg.	Vessels tied by outside Dr.	Antiseptic, blankets and side splints.	Dressed 2d day, cle da
40	23	Struck by falling timber.	Co fr. b. b. of leg.	None.	Antiseptic, iodoform blankets, and side splint.	Dressed 2d da
41	19	Fell down elevator well, drunk.	Co. fr. of b. b. of arm, small opening.	None.	Antiseptic and ant. splint.	Dressed 5th day, padded
42	9	Run over by wagon.	Co. com. of b. b. of leg, sl. laceration.	None.	Antiseptic, post. wire splint, side splints.	Dressed 13th day, dis
43	22	Thrown fr. wagon and dragged.	Co. com. fr. of elbow joint, edges crushed, lac.	None.	Fragments removed, antis. iodof. splints.	Dressed 4th day, su dis
44	52	Crushed in machinery.	Co. com. fr. of b. b. of leg, laceration, dirty.	None.	Antiseptic, iodoform, plaster.	Dressed 7th da
45	34	Thrown fr. team and dragged.	Co. com. fr. b. b. of leg; disloc. of ankle; dirt.	None.	Fragments removed, antiseptic, iodoform and plaster.	Dressed 11th d
46	21	Fell on bricks 14 ft. landed on ft.	Co. fr. b. b. of leg, with laceration.	None.	Antiseptic, tube, plaster.	Dressed 2d d., clean dis
47	24	Run over by horse car.	Co. com. fr. b. b. of leg, into joint, rupt. tendon.	None.	Antiseptic, iodoform, plaster.	Dressed 4th day, so
48	15	Between rope and capstan.	Co. fr. b. b. of leg, laceration.	None.	Antiseptic, iodoform, plaster.	Dressed 18th day, cl bare bone; dr. 78 d.,
49	42	Kick by horse.	Co. fr. b. b. of leg.	None.	Antiseptic, iodoform, plaster.	Dressed 30th da
50	33	Fell from window, drunk.	Co. com. fr. of fibula.	None.	Hydranopthal, antiseptic and plaster.	Dressed 18th da
51	31	Jumped a vaulting pole and struck in sand.	Co. fr. b. b. of leg into joint.	None.	Antiseptic and plaster.	Dressed 3d day, clea dis
52	35	Fell and struck on gravel with knee flexed.	Co. fr. of patella, 1½ in. separation.	None.	Hydranopthal, antiseptic, Malgaine-hooks tube.	Dressed 7th day, cl
53	46	Run over by large team.	Co. com. fr. b. b. of leg into ankle joint. (bag of bones.)	None.	Antiseptic, plaster.	Dressed 20th day, slo healed
54	22	Fell from telegraph pole, 20 ft.	Co. com. fr. b. b. of leg, lacerated.	None.	Antiseptic and splint.	Dressed 14th day, cle
55	19	Drunk, fell fr. window, 1 story.	Co. fr. b. b. of leg, oblique.	Pillow.	Antiseptic and plaster.	Dressed 8th day, slou in tet
56	51	Fell from staging 50 feet.	Co. com. fr. b. b. of leg, shock, hæmorrhage, concussion of brain.	Bandage.	On account of shock, partial antiseptic and plaster.	Dressed 23d day
57	36	Struck with iron beam.	Co. com. fr. b. b. of leg.	None.	Antiseptic, tube and plaster.	Dressed 2d day, cle
58	51	Fell fr. staging 15 ft., alcoholic	Co. com. fr. b. b. of leg, with laceration, shock.	None.	Antiseptic and plaster.	Dressed 11th d., clea
59	30	Fell down elevator well.	Co. com. fr. b. b. of leg, with much laceration and comminution.	None.	Antiseptic and plaster.	Dressed 11th day, s
60	14	Fell from horse car.	Co. fr. of humerus into elbow joint, dirt.	None.	Antiseptic and plaster.	Dress. 3d d., pus, slou
61	21	Fell from team.	Co. com. fr. of b. b. of arm, with laceration; dislocation at elbow, with fracture.	None.	Antiseptic and splint.	Dressed 3d day, pu dis
62	28	Fell down stairs.	Co. fr. b. b. of arm.	None.	Antiseptic and splint.	Dressed 8th da
63	24	Run over by horse car.	Co. com. fr. both bones leg.	None.	Antiseptic and plaster.	Dressed 22d day,
64	38	Pulled over shafting.	Co. fr. b. b. arm, with much laceration and scalp wounds and multiple contusions.	None.	Antiseptic, splints and plaster.	Dressed 13th day,
65	60	Fell down stairs.	Co. com. fr. b. b. arm.	Palmar spl.	Antiseptic and splints.	Dressed 5th day, cle
66	47	Run over by horse car.	Co. com. fr. b. b. of leg, very marked crushing and laceration of tissues.	None.	Antiseptic and splints.	Dressed 3d day, sl. pu
67	36	Struck by falling timber.	Co. com. fr. b. b. both legs.	None.	Antiseptic and tubes, splints.	Dressed 5th day, cl
68	49	Struck by falling cask.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 12th day
69	40	Caught in elevator.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic, tube and Bolles vert. fr. box.	Dressed 2d day,
70	50	Kicked foot against iron beam.	Co. fract. b. b. leg.	None.	Antiseptic and splints, without ether.	Dressed 5th day, clea discharg
71	32	Caught in belting.	Co. com. fr. b. b. both legs.	None.	Antiseptic and splints.	Dressed 1st day, cle 19
72	55	Injury 24 hours before entrance. Struck by flying rock.	Co. fr. humerus, with laceration.	Splints.	Antiseptic with wire splints.	Dressed 3d day, sl. p
73	32	Falling timber struck.	Co. com. fr. b. b. leg.	None.	Antiseptic, iodoform, wires and splints.	Dressed 8th day, cle

clean, fract. box 12th day, healed 19th day, disch. 38th day.		Firm 38th day.		
l day, clear, discharged 75th day.		Fair 25th day.		
ay, clean; dressed 23d day, bowing, ded, etc.; disch. 31st day.		Good 31st day.		
ay, pus, deformity; healed 17th day; discharged 44th day.	Slight pus.	Good 44th day.	Without crutches after 58th day.	Excellent, very slight thickening, no deformity, slight rheumatic pain, otherwise as good as the other.
, superficial pus, granulating surface; discharged 50th day.	Slight pus.			
n day, clean; discharged 74th day.		Good 65th day.	65 days.	
h day, clean; discharged 52d day.	Pneumonia. fragment of bone in joint preventing reduction until removed; simple fr. of other leg.			
ean; dressed 10th d., blood clots, pain; discharged 54th day.		35 d. fair; 54 d. fair.		
y, some slough; discharged 104th day.	Slough.	Fair 90th day.		
y, clean, sl. pus on surface; dr. 60th d., 8 d., granulating sinus; disch. 107th d.	Slight pus, necrosis.		107 days.	
h day, clean; discharged 49th day.		Some 30 d. Good 49 d		
h day, clean; discharged 57th day.	Del. trem. and chronic alcoholism.	Good 57th day.	57 days.	
clean; dressed 37th day, bone removed; discharged 59th day.	Alcoholic, necrosis, delirium tremens interfered with apparatus.	Good 59th day.	300 days.	Excellent, good position, slight "stiffness" in ankle.
y, clean, slough; died 14th day, clean.	Delirium tremens, slough, double pneumonia. Dead.			Dead.
y, slough, bare bone; dressed 46th day, aled: discharged 68th day.	Pneumonia, slough.	Good 68th day.		
y, clean; disch. 48th day against advice.	Delirium tremens.	Nearly firm 44th d.		
, slough (?), pus (?), gradual increase h tetanus; died 11th day.	Alcoholic, slough (?), tetanus, 1st symptom, 7th day. Dead.			Dead.
d day, clean; discharged 74th day.	Cerebral injury, hæmiplegia (r.), influenza.		194 days.	Hæmiplegia (r), excellent, no deformity, no trouble.
, clean but pus later; disch. 171st day.	Pus, slough, necrosis.	Delayed probably 171 days.	440 days.	Prolonged necrosis, still dead bone, considerable bowing and displacement, fair.
clean (at autop.); died 11 d., autopsy.	Alcohol, fr. of ribs, chronic nephritis, pleurisy, contusion of liver, spleen, etc.			
lay, slough, necrosis; disch. 87th day.	Slough, necrosis.	Firm 78th day.		
, slough, fol. by necrosis; disch. 68th d.	Sl. pus, slough, necrosis.		Used arm 1 month after discharge.	Ankylosis at elbow, but perfect rotation, useful arm, can hold pen & write with ease.
y, pus, incision, tubes etc., necrosis; discharged 72d day.	Pus, ad lib., with cellulitis, necr.	Firm 72d day.	Worked with arm 6 weeks aft. disch.	Ankylosis of wrist, 30° motion in elbow to a right angle, useful arm, drives 4-6 horses constantly and with no difficulty.
h day, clean; discharged 43d day.		Slight 43d day.		
day, clean; discharged 104th day.		Fair 97th day.		
day, slough, sl. pus; disch. 25th day.	Slough, slight pus.			
, clean; 15th d., sl. pus; disch. 36th d.	15th day, slight pus.			
sl. pus; disch. 54th day, ag'nst advice.	Slough, pus slight.	None on 55th day.		
ay, clean, necrosis; disch. 166th day.	Great shock, necrosis, influenza.			
h day, clean; discharged 48th day.				
day, pus, slough; disch. 115th day.	Pus, slough, skin grafting.	Good 115th day.		
, clean; 9th day, much pus and slough; charged 73d day, necrosis.	Slough, necrosis, 9th day much pus, phthisis.		Walked 133d day.	Excellent, no deformity, good position.
y, clean; dressed 5th day, pus; disch'd 19th day. Dead.	Severe shock, pus, alcohol, D. T.'s, nephritis.			Dead.
, sl. pus, slough, necrosis; disch. 53d d.	Slight pus, slough, necrosis.	None.		
y, clean, sl. necrosis; disch. 190th day.	Slt. necrosis, pus follo'd removal of wires, with suppuration in knee jt.	180th day firm.		

XUM

in a fracture, whether it be simple or compound, is a symptom that we never disregard, and requires a careful investigation as to its cause. Frequently the simple division of the plaster in front is a relief to the pain. The plaster can be held together by straps and buckles.

Formerly if a plaster of Paris bandage leaked through we changed the dressing. Now, however, we re-inforce the plaster of Paris bandage at the point at which the leak first occurs by applying an antiseptic dressing outside of this. In case we find marked bowing or lateral displacement in a compound fracture at the end of a fortnight or three weeks, it is corrected by suitably applied pads, and if necessary tenotomy of the tendo-Achillis under an anæsthetic. Occasionally we resort to the use of Smith's anterior splint, or a fracture box, and the best of these is Dr. Bolles's.

A large number of the one hundred and sixty cases that we report came from the dissolute class of the community. Alcoholism and delirium tremens were common complications, and resulted in the death of eight cases.[1] Yet in managing a compound fracture in an alcoholic there is nothing more satisfactory than to place it in a plaster of Paris bandage for protection. He can then thrash about without destroying his limb. Even in the most hopeless cases, where delirium tremens, pneumonia, or uræmia complicate a compound fracture, the practitioner should never forget that the plaster of Paris bandage requires changing at appropriate intervals of time. Unless this precaution is taken, a limb with backward or lateral displacement of the fragments may come out of the plaster of Paris bandage at the end of six weeks.

The Prognosis:—

The restoration of the limb to usefulness is a matter of great interest. In our Table IV. (Immediate and Ultimate Results), a certain number of cases are reported where

[1] Vide Table VI.

there was a slight amount of pus; where there was considerable pus; where there has been a slough, and where there has been necrosis; and while all these hinder the rapid recovery of the patient, the patients almost always have useful limbs. So far as our investigation has led us we have found only two cases with useless limbs. One is possibly due to acquired flat-foot from the injury; the second is a fore-arm, where after a compound fracture of both bones, without extensive destruction of the soft parts, non-union and a "dangle" limb is reported. Primary amputation was advised in this case. In a number of cases amputation of the limb was advised, and yet the patients recovered with useful limbs. This has led us to be extremely careful about advising a primary amputation.

Lateral displacement and backward bowing of the leg are the common deformities in aduits; but not in children. The danger from sepsis is very slight; although there has been pus in a small number of cases yet there has been no death from sepsis. There have been two cases of death from tetanus, and one from fat embolism. (Table VI. Causes of death, and age of patients, are instructive).

The prognosis of a compound fracture of the limb depends upon the same considerations that determine whether the limb shall be amputated or not. Extensive crushing of the soft parts hinders the restoration of the limb to usefulness fully as much as necrosis of the bone. If at the end of six months a sinus remains, and loose fragments can be detected, an operation for their removal is indicated.[1]

In short, we have come to regard the prognosis of compound fractures as very favorable. As an example of the confidence which is felt by one surgeon in the treatment of compound fractures, we may say that he has told us that if he had a "simple complicated" fracture, which was attended by much pain, he should not hesitate to have it converted

[1] Vide Tables II., IV. and V. in this connection.

Case.	Age.	How Injury Occurred.	Character of Injury.	Previous Treatm't.	How Treated.	Manag
74	14	Caught in elevator.	Co. fr. b. b. leg and tarsus comminuted.	None.	Antiseptic, tube, wire and splints.	Dressed 4th day
75	28	Run over by team.	Co. com. fr. b. b. leg into joint.	None.	Antiseptic and splints.	Dressed 4th day, clea gangrene, di
76	50	Fell down stairs.	Co. com. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 8th day,
77	27	Kicked by horse.	Co. fr. b b. leg.	None.	Antiseptic and plaster.	Dressed 30th day
78	43	Fell on street.	Co. com. fr. b. b. leg into ankle joint.	None.	Antiseptic and plaster.	Dressed 18th day, cl
79	52	Str'k, falling plank, & run over.	Co. com. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 9th day,
80	28	Run over by team.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic and plaster.	Dressed 7th day, cle
81	42	Thrown from bicycle.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 12th day,
82	23	Fell 19 feet, from staging.	Co. fr. humerus, with laceration.	None.	Antiseptic and plaster.	Dressed 4th day, sl't p
83	60	Fell from car.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic, wire and plaster.	Dressed 6th day, cl
84	46	Fell from staging 12 ft., and struck by falling timber.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic, iodoform and plaster.	Dressed 29th day
85	18	Kicked by horse.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 20th day
86	7	Caught in spokes of wheel.	Co. com. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 16th day
87	10	Fell from cherry tree.	Co. fr. (com.) femur.	None.	Antiseptic and extension.	Dressed 11th day
88	13	Run over by horse car.	Co. com. fr. b. b. leg, with much laceration.	None.	Antiseptic, iodoform, tube and plaster.	Dressed 5th day,
89	32	Thrown by derrick rope.	Co. Colles, both arms.	None.	Antiseptic and splints.	Dressed 14th day
90	50	Run over by team.	Co. fr. b. b. leg, comminuted, with laceration.	None.	Antisep. & plas., amputation 27th day.	Dressed 8th day, n
91		" " " "	Co. fr. astragalus (other foot).	None.	Antiseptic and plaster.	Dressed 8th day,
92	14	Run over by wagon.	Co. com. fr. b. b. leg, with very marked lacer'n.	Splint.	Antiseptic and plaster, skin grafting.	Dressed 3d day, lar
93	10	Run over by street car.	Co. fr. b. b. leg.	Partial antiseptics and splints.	Antiseptic and plaster.	Dressed 8th day
94	40	Thrown from cart.	Co. com. T fr. of femur into knee joint.	None.	Antiseptic and plaster, iodoform.	Dressed 2d day,
95	18	Swinging fr. end moving train, struck foot ag'nst stone culvert.	Co. com. fr. b. b. leg, with marked laceration.	None.	Antiseptic and plaster.	Dressed 15th day, clea
96	36	Kicked by horse, and dragged.	Co. com. fr. b. b. leg.	None.	Antiseptic, wire and plaster.	Dressed 10th day,
97	30	Struck by steam shovel.	Co. fr. b. b. leg, with laceration.	None.	Antiseptic, iodoform and plaster.	Dressed 13th day
98	18	Thrown from train 2 weeks before entrance.	Co. fr. b. b. arm into elbow joint.	Water dr. & mill board int. splint.	Antiseptic and plaster.	Dressed 5th day, slou
99	15	Caught in pulley.	Co. com. fr. b. b. leg into ank. jt., much lacer'n.	None.	Antiseptic, drainage and plaster.	Dressed 5th day, gan cha
100	47	Fell down stairs.	Co. fr. b. b. leg, with laceration.	None.	Antiseptic and plaster.	Dressed 20th day
101	75	Slipped and fell down one step.	Co. fr. b. b. leg, with laceration.	None.	Antiseptic and plaster.	Dressed 16th day, lar
102	27	Fell from cart.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic and plaster, tenotomy, tendo Achil.	Dressed 14th day, slo
103	32	Thrown from team.	Co. fr. and disloca. of astragalus, with lacer'n.	None.	Antis. and plaster, removal of ½ of astragalus.	Dressed 44th day
104	67	Run over by horse car.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic and side splints.	Dressed (?) sligh
105	89	Fell from wagon.	Com. fr. b. b. leg.	Splints.	Antiseptic and plaster.	Dressed 15th day,
106	43	Wound around shaft.	Co. fr. com. b. b. arm, with multiple fractures.	None.	Antiseptic and plaster, amputation 17th day.	Dressed 5th day, sloug
107	39	Fell from step ladder, and stuck shears into arm.	Co. com. fr. humerus.	None.	Antiseptic and plaster.	Dressed 25th day,
108	29	Fell 20 feet, from staging.	Co. Potts fr., with comminution into joint.	None.	Antiseptic and plaster.	Dressed 27th day,
109	7	Run over by team.	Co. fr. tibia.	None.	Antiseptic and plaster.	Dressed 30th day,

ANAGEMENT OF CASE.	COMPLICATIONS.	UNION.	WHEN BORE WEIGHT ON LEG.	ULTIMATE RESULT.
day, clean, discharged 66th day.				
clean, dressed 6th day, cellulitis and e, discharged 25th day, dead.	Alcohol, D.T.'s, cellulitis, gangrene, secondary hemorrhages.			Dead.
day, clean, discharged 68th day.		Good, 68th day.		
day, clean, discharged 67th day.		Good, 67th day.		
y, clean, discharged 20th day, dead.	Alcoholic, D. T.'s.			Dead.
day, clean, discharged 86th day.		Good, 77th day.		
y, clean, discharged 13th day, dead.	Alcoholic, D. T.'s.			Dead.
day, slough, discharged 60th day.	Slough.			
l't pus, much pus, necrosis, discharged 120th day.	Pus, much necrosis.	Good, 120th day.		
y, clean, discharged 8th day, dead.	Alcohol, D. T.'s, œdema of lungs.			Dead.
day, clean, discharged 69th day.			5 months, worked 11 months.	Some bowing, slt deformity, 1 inch shortening, good.
day, clean, discharged 41st day.		Moderate, 41st day.	71 days.	Excellent, carries pianos, &c. good position.
day, clean, discharged 70th day.		Fair, 70th day.		
day, clean, discharged 85th day.	Anæmia.	Firm, 45th day.	106 days.	Excellent, w'k'd without limp, good posit'n.
day, slough, discharged 60th day.	Crush of other foot, slough, diphtheria.	Fair, 60th day.		Marked bowing, requiring refracture. Later, good useful leg, no limp.
day, clean, discharged 26th day.				
ay, much pus, discharged 76th day.	Shock, cardiac and phthisis, pus.			Amputation 27th day.
day, clean, discharged 76th day.	Shock, cardiac and phthisis.			
, large slough, necrosis, discharged 146th day.	Large slough, necrosis.	Delayed, springy, May 21, 1892.	15 months after discharge?	Not entirely healed. old necrosis, not firm union, severe bowing, good.
day, clean, discharged 73d day.			160 days.	Excellent, no deformity, good position.
day, clean, discharged 91st day.	D. T.'s, walked on leg.	Firm, 85th day.		
clean, discharged 24th day, insubordination.				
			1 year.	Excellent, very few symptoms later.
day, clean, discharged 106th day.				
day, clean, discharged 74th day.		Good, 74th day.		
, slough, less pus, disch'd 109th day.	Old suppurating co. fr. of leg, amputation, slough.	Firm, 109th day.	Worked with arm 6 months after injury.	Good, very useful arm, considerable deformity, but strong and works as brass finisher.
gangrene, amputation 6th day, discharged 40th day.	Gangrene, amputation 6th day.			Amputation.
h day, clean, discharged 43d day.		Firm, 43d day.	Walked 10 months, worked 13 months.	Excellent, slt. bowing, good leg.
y, large slough, discharged 95th day.	Refused treatment 1st day, treated 2d day, large slough.	Firm, 95th day.		
r, slough, necrosis, disch'd 114th day.	Necrosis.	Firm, 114th day.		
day, clean, discharged 72d day.	Left arm previously amputated at shoulder.		5 months.	Excellent, good position, good motion.
slight pus, discharged 135th day.	Shock, measles, crush of other foot.	Firm, 135th day.		
day, clean, discharged 48th day.		Firm, 48th day.		
slough and pus, discharged 58th day.	Multiple fractures, slough and pus, amputated 17th day.			Amputation 17th day.
day, clean, discharged 59th day.				
day, clean, discharged 57th day.			200 days, worked yr. after injury.	Excellent, slt. deformity.
day, clean, discharged 60th day.			58th day.	Excellent, no deformity, good position, walked without limp.

103	32	Thrown from team.	Co. fr. and disloca. of astragalus, with lacer'n.	None.	Antis. and plaster, removal of ½ of astragalus.	Dressed 44th d
104	67	Run over by horse car.	Co. com. fr. b. b. leg, with laceration.	None.	Antiseptic and side splints.	Dressed (?) sli
105	89	Fell from wagon.	Com. fr. b. b. leg.	Splints.	Antiseptic and plaster.	Dressed 15th da
106	43	Wound around shaft.	Co. fr. com. b. b. arm, with multiple fractures.	None.	Antiseptic and plaster, amputation 17th day.	Dressed 5th day, slo
107	39	Fell from step ladder, and stuck shears into arm.	Co. com. fr. humerus.	None.	Antiseptic and plaster.	Dressed 25th da
108	29	Fell 20 feet, from staging.	Co. Potts fr., with comminution into joint.	None.	Antiseptic and plaster.	Dressed 27th da
109	7	Run over by team.	Co. fr. tibia.	None.	Antiseptic and plaster.	Dressed 30th da
110	8	Fell two stories.	Co. fr. tibia.	None.	Antiseptic and plaster.	Dressed 8th day
111	55	Barrel of cement fell on leg.	Co. com. fr. tibia.	None.	Antiseptic and plaster.	Dressed 27th day, s
112	32	Struck by beam.	Co. fr. com. femur.	Partial. Antiseptic.	Operation, third day, antiseptic and extension.	Dressed 11th da
113	47	Fell on sidewalk.	Co. com. fr. b. b. leg.	None.	Temporary dressing, antiseptic and side splints.	Dressed 11th day, sli
114	27	Kicked by horse.	Co. com. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 12th da
115	41	Kicked by horse.	Co. com. fr. tibia.	Splint.	Antiseptic and plaster.	Dressed 17th da
116	53	Fell down stairs.	Co. com. fr. humerus.	None.	Antiseptic and splint.	Dressed 9th day, clea
117	34	Fell down stairs.	Co. com. fr. humerus into elbow joint.	Splint.	Antiseptic and plaster.	Dressed 20th da
118	28	Fell from car (freight).	Co. com. fr. b. b. arm.	None.	Antiseptic and splints.	Dressed 18th d
119	30	Drunk, fell on sidewalk.	Co. com. fr. b. b. leg with much laceration.	None.	Antiseptic and plaster.	Dressed 8th day, la
120	28	Fell from train, alcoholic.	Co. fr. b. b. leg with consid laceration.	None.	Antiseptic dressing, skin grafting.	Dressed 2d day, much
121	14	Shot by toy cannon.	Co. com. (lac.) fr. b. b. leg with much laceration.	None.	Antiseptic and plaster.	Dressed 15th day, cle
122	59	Fell down stairs, drunk.	Co. fr. b. b. arm.	None.	Antiseptic and splints.	Dressed 7th day
123	42	Thrown on street.	Co. fr. b. b. leg com.	None.	Antiseptic and plaster.	Dressed 21st day,
124	43	Kicked in shin.	Co. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 17th da
125	10	Fell off stone wall.	Co. fr. humerus with simple fr. ulnar.	Temp. dress gauge and splint.	Antiseptic and splints.	Dressed 5th day, slou
126	4	Run over by wagon.	Co. com. fr. b. b. leg with laceration and fr. thigh.	None.	Antiseptic and plaster.	Dressed 20th da
127	48	Thrown from team.	Co. fr. com. of ulnar with co. fr. skull.	None.	Antiseptic and plaster.	Dressed 8th day
128	48	Fell down stairs on ship-board. Injury 6 days before entrance by ship surgeon.	Co. fr. humerus with laceration.	Antiseptic and splint with tube.	Antiseptic and splint.	Dressed 5th da
129	8	Fell on sidewalk, playing leap-frog.	Co. com. fr. humerus into elbow joint with much laceration. Occlusion Brachial Artery.	None.	Antiseptic and splint.	Dressed 9th da
130	14	Caught in elevator.	Co. com. fr. b. b. leg with very marked laceration.	Antiseptic and splints.	Antiseptic and plaster.	Dressed 26th day, la
131	66	Run over by wagon.	Co. com. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 12th day, slo
132	11	Fell off fence.	Co. com. fr. b. b. leg.	Antiseptic spl. & tube.	Antiseptic and plaster.	Dressed 23d day, ve
133	38	Fell one flight.	Co. com. fr. b. b. arm.	Splint.	Antiseptic and splint.	Dressed 10th day
134	55	Coal car fell against him.	Co. com. fr. femur into knee joint.	None.	Antiseptic and extension.	Dr. 6th day, slough,
135	60	Fell 20 feet off from staging.	Co. fr. tibia, with laceration and fr. ribs.	Splints.	Antiseptic and plaster.	Dressed 6th day
136	40	Caught in balance wheel of stone crusher.	Co. disloc. of astragalus with multiple contusions and great shock.	None.	Antiseptic, tube and splint.	Dressed 3d day
137	40	Caving in of bank.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 10th day
138	67	Fell down stairs, 7 ds. bef. ent.	Co. fr. b. b. leg.	None (?)	Antiseptic and side splints.	Dressed 11th day
139	17	Fell 7 feet.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 12th day
140	24	Fell from window, 8 feet.	Co. fr. b. b. legs.	None.	Antiseptic and plaster.	Dressed 12th day
141	31	Run over by team.	Co. fr. b. b. leg with marked laceration.	None.	Antiseptic and plaster.	Dressed 5th day
142	40	Run over by team.	Co. com. fr. b. b. leg, with much laceration.	None.	Antiseptic and plaster.	Dressed 9th day
143	70	Fell down stairs.	Great shock. Co. disloc. ankle with fr. fibula.	None.	Antiseptic and plaster.	Dressed 5th day, clean
144	39	Fell down stairs.	Co. fr. b. b. leg.	Temp'y dr.	Antiseptic and plaster.	Dressed 17th da
145	63	Struck by falling sign.	Co. com. fr. b. b. leg with very much laceration.	None.	Antiseptic and plaster.	Dressed 20th

h day, clean, discharged 72d day.	Left arm previously amputated at shoulder.		5 months.	Excellent, good position, good motion.
slight pus, discharged 135th day.	Shock, measles, crush of other foot.	Firm, 135th day.		
h day, clean, discharged 48th day.		Firm, 48th day.		
slough and pus, discharged 58th day.	Multiple fractures, slough and pus, amputated 17th day.			Amputation 17th day.
h day, clean, discharged 59th day.				
h day, clean, discharged 57th day.			200 days, worked yr. after injury.	Excellent, slt. deformity.
h day, clean, discharged 60th day.			58th day.	Excellent, no deformity, good position, walked without limp.
day, slough, discharged 133d day.	Slough.	Firm, 123d day.		
ay, small slough, discharged 57th day.	Small slough.	Firm, 57th day.	147 days.	Excellent, slt. backward bowing, otherwise perfect, works "along shore."
h day, clean, discharged 76th day.		Fair, 76th day.		
y, slt. pus, necrosis, disch'd 113th day.	Slight pus, necrosis.	Firm, 113th day.	200 days.	Good, backward bowing (slt.), slt. pain., slt deformity.
h day, clean, discharged 49th day.				
h day, clean, discharged 22d day.			6 months.	Excellent, slight deformity, walks without limp, "as good as the other."
clean, discharged 29th day, O. R. A. A.				
h day, clean, discharged 41st day.		Firm, 41st day.		
8th day, pus, discharged 33d day.	Pus.			
y, large slough, necrosis, discharged 190th day.	Alcohol and D. T's, large slough, necrosis.	Firm, 150th day.		Considerable deformity, still unable to work, necrosis, fair.
much slough, disch'd 66th day, O.R.A.A.	Slough, much skin grafts.			
, clean, bone exposed, disch'd 17th day.	Bone exposed, necrosis.	Firm, 77th day.		
h day, clean, discharged 19th day.				
day, slt. pus, discharged 153d day.	Delayed union.	Slight, 153d day.		Excellent, no deformity, good position.
h day, clean, discharged 61st day.	D. T,s.	Good, 61st day.	181 d., walk w. cane.	
slough and much pus, disch'd 122d day.	Slough, pus.	Firm, 122d day.		
h day, clean, discharged 71st day.	Fr. thigh.	Firm, 67th day.	67 days.	
h day, clean, discharged 44th day.	Co. fr. skull.	Good, 44th day.	74 days, went out, still unable to do hard work.	Fair, considerable deformity, large callus, evidently went out before union was solid.
th day, pus, discharged 64th day.	Pus.	Good, 60th day.		Excellent, no deformity, 70 degree motion at elbow.
h day, clean, discharged 23d day.	Occlusion of brachial artery.		40 days.	Absolutely perfect in every way.
ay, large slough, discharged 89th day.	Large slough.	Fair, 89th day.		
, slough, slt. pus, necrosis, disch. 91 d.	Slough and slight pus, necrosis.		230 d., still on cr'ch	Necrosis, unable to bear weight on leg, fair.
y, very slt. pus, discharged 40th day.	Follicular tonsillitis, very slt. pus.	Fair, 40th day.		
h day, clean, discharged 44th day.	D. T's.			
ugh, sl. necrosis, slt. pus, disch. 193d d.	Slough, slt. pus, slt. necrosis.	Firm, 193d day.		
h day, clean, discharged 38th day.		Fair, 38th day.		
d day, pus, discharged 137th day.	Great shock, sloughing of contusions in back, pus.		Walked with 1 crch 2 mos. aft. disch.	Good, no deformity, fairly good motion.
h day, clean, discharged 68th day.		Good, 68th day.		
h day, clean, discharged 111th day.		Firm, 111th day.		
th day, clean, discharged 68th day.		Fair, 68th day.		
th day, clean, discharged 58th day.	Tonsillitis.		150 days.	Good position, still walks with one crutch, excellent.
h day, clean, discharged 55th day.		Fair, 55th day.		
h day, clean, discharged 67th day.	Rupt. posterior tibial artery, D. T's.	Firm, 67th day.	157 days.	Excellent, no deformity, fair position.
, clean, discharged 5th day, dead, D. T's.	Great shock, D. T's, alcohol.			Death.
th day, clean, discharged 51st day.		Fair, 51st day.	150 days.	Excellent, no deformity, good position.
d 20th day, discharged 82d day.	Alcohol, D. T's, slough.	Firm, 82d day.		

[illegible]	[illegible]	[illegible]	[illegible]	None.	[illegible]	[illegible]
121	14	Shot by toy cannon.	Co. com. (lac.) fr. b. b. leg with much laceration.	None.	Antiseptic and plaster.	Dressed 15th day,
122	50	Fell down stairs, drunk.	Co. fr. b. b. arm.	None.	Antiseptic and splints.	Dressed 7th
123	42	Thrown on street.	Co. fr. b. b. leg com.	None.	Antiseptic and plaster.	Dressed 21st
124	43	Kicked in shin.	Co. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 17th
125	10	Fell off stone wall.	Co. fr. humerus with simple fr. ulnar.	Temp. dress gauge and splint.	Antiseptic and splints.	Dressed 5th day,
126	4	Run over by wagon.	Co. com. fr. b. b. leg with laceration and fr. thigh.	None.	Antiseptic and plaster.	Dressed 20th
127	48	Thrown from team.	Co. fr. com. of ulnar with co. fr. skull.	None.	Antiseptic and plaster.	Dressed 8th
128	48	Fell down stairs on ship-board. Injury 6 days before entrance by ship surgeon.	Co. fr. humerus with laceration.	Antiseptic and splint with tube.	Antiseptic and splint.	Dressed 5th
129	8	Fell on sidewalk, playing leap-frog.	Co. com. fr. humerus into elbow joint with much laceration. Occlusion Brachial Artery.	None.	Antiseptic and splint.	Dressed 9th
130	14	Caught in elevator.	Co. com. fr. b. b. leg with very marked laceration.	Antiseptic and splints.	Antiseptic and plaster.	Dressed 26th da
131	66	Run over by wagon.	Co. com. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 12th day,
132	11	Fell off fence.	Co. com. fr. b. b. leg.	Antiseptic spl. & tube.	Antiseptic and plaster.	Dressed 23d day
133	38	Fell one flight.	Co. com. fr. b. b. arm.	Splint.	Antiseptic and splint.	Dressed 10th
134	55	Coal car fell against him.	Co. com. fr. femur into knee joint.	None.	Antiseptic and extension.	Dr. 6th day, slou
135	60	Fell 20 feet off from staging.	Co. fr. tibia, with laceration and fr. ribs.	Splints.	Antiseptic and plaster.	Dressed 6th
136	40	Caught in balance wheel of stone crusher.	Co. disloc. of astragalus with multiple contusions and great shock.	None.	Antiseptic, tube and splint.	Dressed 3d
137	40	Caving in of bank.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 10th
138	67	Fell down stairs, 7 ds. bef. ent.	Co. fr. b. b. leg.	None (?)	Antiseptic and side splints.	Dressed 11th
139	17	Fell 7 feet.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 12th
140	24	Fell from window, 8 feet.	Co. fr. b. b. legs.	None.	Antiseptic and plaster.	Dressed 12th
141	31	Run over by team.	Co. fr. b. b. leg with marked laceration.	None.	Antiseptic and plaster.	Dressed 5th
142	40	Run over by team.	Co. com. fr. b. b. leg, with much laceration.	None.	Antiseptic and plaster.	Dressed 9th
143	70	Fell down stairs.	Great shock. Co. disloc. ankle with fr. fibula.	None.	Antiseptic and plaster.	Dressed 5th day,
144	39	Fell down stairs.	Co. fr. b. b. leg.	Temp'y dr.	Antiseptic and plaster.	Dressed 17th
145	63	Struck by falling sign.	Co. com. fr. b. b. leg with very much laceration.	None.	Antiseptic and plaster.	Dressed
146	10	Run over by railroad train.	Co. com. fr. b. b. leg with much laceration.	None.	Antiseptic and plaster.	Dressed 3d day, sl
147	40	Explosion.	Com. fr. humerus with abrasion of skin.	None.	Entension to arm with gauze.	Dressed 1st da
148	43	Wound around shaft.	Co. com. fr. b. b. arm with very marked laceration and multiple contusions.	None.	Antiseptic and plaster.	Dressed 4th day
149	49	Fell on street.	Co. fr. b. b. leg.	1st d., temp. dressing.	Second day, antiseptic and plaster.	Dressed 8th
150	51	Struck by bale of hay.	Co. com. fr. b. b. leg.	None.	Antiseptic wire and plaster.	Dressed 6th d
151	38	Fell into hold of vessel, 30 feet	Co. Colles, fracture.	1st d., temp dressing.	Antiseptic and splints.	Dressed
152	40	Fell on street.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dresse
153	33	Struck by falling barrels.	Co. fr. b. b. leg, com.	None.	Antiseptic and plaster.	Dressed 20t
154		Struck by falling barrels.	Co. fr. femur.	None.	Antiseptic and plaster.	Dressed 26t
155	50	Fell down stairs.	Co. fr. com. of humerus into elbow with disloc.	None.	Antiseptic and plaster.	Dressed 25th
156	20	Fell from horse car.	Co. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 29th
157	25	Struck by falling timber.	Co. com. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 11th da
158	17	Thrown from double-runner.	Co. fr. b. b. leg with laceration.	None.	Antiseptic and plaster.	Dressed 23d
159	28	Struck by falling timber.	Co. fr. b. b. leg.	None.	Antiseptic and splints.	Dr. 3d day, sl. p
160	40	Struck by cake of ice.	Co. com. fr. b. b. leg.	None.	Antiseptic and plaster.	Dressed 14th

..., much slough, disch'd 60th day, O.R.A.A.	Slough, much skin grafts.			
day, clean, bone exposed, disch'd 17th day.	Bone exposed, necrosis.	Firm, 77th day.		
7th day, clean, discharged 19th day.				
1st day, slt. pus, discharged 153d day.	Delayed union.	Slight, 153d day.		Excellent, no deformity, good position.
17th day, clean, discharged 61st day.	D. T,s.	Good, 61st day.	181 d., walk w. cane.	
ay, slough and much pus, disch'd 122d day.	Slough, pus.	Firm, 122d day.		
20th day, clean, discharged 71st day.	Fr. thigh.	Firm, 67th day.	67 days.	
8th day, clean, discharged 44th day.	Co. fr. skull.	Good, 44th day.	74 days, went out, still unable to do hard work.	Fair, considerable deformity, large callus, evidently went out before union was solid.
d 5th day, pus, discharged 64th day.	Pus.	Good, 60th day.		Excellent, no deformity, 70 degree motion at elbow.
d 9th day, clean, discharged 23d day.	Occlusion of brachial artery.		40 days.	Absolutely perfect in every way.
h day, large slough, discharged 89th day.	Large slough.	Fair, 89th day.		
day, slough, slt. pus, necrosis, disch. 91 d.	Slough and slight pus, necrosis.		230 d., still on cr'ch	Necrosis, unable to bear weight on leg, fair.
d day, very slt. pus, discharged 40th day.	Follicular tonsillitis, very slt. pus.	Fair, 40th day.		
10th day, clean, discharged 44th day.	D. T's.			
slough, sl. necrosis, slt. pus, disch. 193d d.	Slough, slt. pus, slt. necrosis.	Firm, 193d day.		
d 6th day, clean, discharged 38th day.		Fair, 38th day.		
ed 3d day, pus, discharged 137th day.	Great shock, sloughing of contusions in back, pus.		Walked with 1 crch 2 mos. aft. disch.	Good, no deformity, fairly good motion.
10th day, clean, discharged 68th day.		Good, 68th day.		
11th day, clean, discharged 111th day.		Firm, 111th day.		
d 12th day, clean, discharged 68th day.		Fair, 68th day.		
d 12th day, clean, discharged 58th day.	Tonsillitis.		150 days.	Good position, still walks with one crutch, excellent.
d 5th day, clean, discharged 55th day.		Fair, 55th day.		
d 9th day, clean, discharged 67th day.	Rupt. posterior tibial artery, D. T's.	Firm, 67th day.	157 days.	Excellent, no deformity, fair position.
day, clean, discharged 5th day, dead, D. T's.	Great shock, D. T's, alcohol.			Death.
d 17th day, clean, discharged 51st day.		Fair, 51st day.	150 days.	Excellent, no deformity, good position.
ssed 20th day, discharged 82d day.	Alcohol, D. T's, slough.	Firm, 82d day.		
ay, slough, disch'd 10th day, dead. Tetanus.	Shock, tetanus, 1st symptom 7th d.			Death.
st day, slough, discharged 42d day, pus.	Very marked shock, slough and pus.		72 days.	Excellent, good position, no deformity.
h day, clean, necrosis, slt. pus, discharged 42d day, no union.	Laceration and comminution very marked, amputation advised, necrosis, slt. pus.	Delayed, none 42d day.		Useless, no union.
d 8th day, clean, discharged 45th day.	Alcohol.		150 days.	Slt. necrosis, no deformity, good position, good.
5th day, clean, discharged 6th day, dead.	D. T's.			Dead.
sed 3d day, slt. pus, discharged (?)	Marked shock, alcohol, D. T's.			
ressed 9th day, clean, discharged.	Alcoholism, D. T's.		100 days.	Good, some bowing and displacement.
d 20th day, clean, discharged 92d day.			150th day, fair.	Excellent, slt. deformity, good position.
d 26th day, clean, discharged 92d day.				Excellent, slt. bowing, otherwise perfect.
d 25th day, clean, discharged 30th day.				
d 29th day, clean, discharged 62d day.	Fracture other foot.	Good 62d day.		
th day, small slough, discharged 63d day.			Still on crutches.	
d 23d day, clean, discharged 54th day.		Not formed yet.		Still some mobility, unable to walk, slt. bowing, excellent.
sl. pus, necrosis, slough; disch. 138th day.	Slight pus, slough, necrosis.			
d 14th day, clean; discharged 54th day.		Good, 54th day.		

XUM

into a compound fracture, that the cause of the pain might be determined and, if possible, remedied. This is, perhaps, too confident a view to take of a compound fracture; but it illustrates the marked change in results which has occurred.

Conclusions:—

(1) That every compound fracture of the thigh, leg, arm and fore-arm should be rendered scrupulously, surgically clean, and should be absolutely immobilized.

(2) That this immobilization is conveniently attained by the light, circular, plaster of Paris, washed bandage.

(3) That a plaster of Paris bandage should not be allowed to remain on a limb over a fortnight in the first month of treatment of a compound fracture, as backward bowing and lateral displacement can be avoided by this precautiou.

(4) That while pus, slough, necrosis or deformity may exceptionally occur, yet the rule is, union by first intention, and the early restoration of limbs to usefulness.

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I.

TREATMENT AND IMMEDIATE RESULTS.

Immediate Results.	Dead.	First Intention.	Slight Pus.	Pus.	Slight Slough.	Slough.	Slight Necrosis.	Necrosis.	Pus and Slough.	Pus and Necrosis.	Slough and Necrosis.	Pus, Slough, Necrosis.	Amputation.	Totals.
Antiseptic and Plaster,	9	61	4	1	4	10		2	2	2	4	1	3	103
Antiseptic with Plaster,	2	20	5	5		2	1	2	3	1	2	3		46
Treated with Tubes,	3	5	2	1		2		1	2		1	1		18
Totals,	14	86	11	7	4	14	1	5	7	3	7	5	3	167

There are in all 160 cases; a number of these are entered twice, that is, under the head of dead, and under the condition of the limb when dressed. This accounts for the number 167.

II.

AGE AND IMMEDIATE RESULTS.

	Dead.	First Intention.	Slight Pus.	Pus.	Slight Slough.	Slough.	Slight Necrosis.	Necrosis.	Pus and Slough.	Pus and Necrosis.	Slough and Necrosis.	Pus, Slough, Necrosis.	Amputation.	Totals.
Under 15 yrs.	4	12	3		1	4		1			2	1		28
15–30 "	3	21	3	4	1	3		1	2	1	2	1	2	44
30–45 "	3	26	2	2	1	4	1	3	4	1	2		1	50
45–60 "	2	23		1	1	1			1	1		3		33
Over 60 "	2	4	3			2					1			12
Totals,	14	86	11	7	4	14	1	5	7	3	7	5	3	167

There were in all 160 cases; a number of these are entered twice, that is, under the head of dead, and under the condition of the limb when dressed. This accounts for the number 167.

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III.

TREATMENT AND ULTIMATE RESULTS.

Ultimate Results.	Perfect.	Excellent.	Good.	Fair.	Useless.	Totals.
Antiseptic and Plaster,		22	7	4	1	34
Antiseptic without Plaster,	[1]1	9	1			11
Treated with Tubes,	[1]1	3	2	1		7
Totals,	2	34	10	5	1	52

The following definitions of the terms excellent, good and fair will be of value in estimating the results:

Excellent.—With no deformity, and good useful limbs.

Good.—A limb with possibly some deformity or weakness, but not useless.

Fair.—Limbs which are complicated by marked deformity, continued necrosis, and which are not yet useful, but will probably become so.

IV.

IMMEDIATE AND ULTIMATE RESULTS.

Ultimate Results.	First Intention.	Slight Pus.	Pus.	Slight Slough.	Slough.	Slight Necrosis.	Necrosis.	Pus and Slough.	Pus and Necrosis.	Slough and Necrosis.	Pus, Slough, Necrosis.	Totals.
Perfect,	2											2
Excellent,	21	4	2	1	1		1	2		1	1	34
Good,	3		1		1			1	2	1	1	10
Fair,	2									1	2	5
Useless,									1			1
	28	4	3	1	2		1	3	3	3	4	52

[1] Fracture into elbow joint with perfect motion; no deformity.

V.

AGE AND ULTIMATE RESULTS.

Ultimate Results.	Under 15.	15-30.	30-45.	45-60.	Over 60.	Totals.
Perfect,	2					2
Excellent,	7	8	13	6		34
Good,	3	1	3	3		10
Fair,			2	2	1	5
Useless,			1			1
Totals,	12	9	19	11	1	52

VI.

CAUSES OF DEATH AND AGE OF PATIENTS.

Causes of Death.	Males.	Females.	Total.	Under 15.	15-30.	30-45.	45-60.	Over 60.
[1]Delirium Tremens,	8		8		1	4	1	2
[2]Fat Emboli,	1		1		1			
[3]Tetanus,	1	1	2	1	1			
Multiple Injuries,	3		3	2		1		
	13	1	14	3	3	5	1	2

[1] One case complicated by Double Pneumonia and one by Nephritis.
[2] Case No. 3.
[3] Cases No. 55 and 146.

ARTICLE XXVII.

THE NECESSITY OF A REVISION OF THE CLASSIFICATION AND NOMENCLATURE EMPLOYED IN THE VITAL STATISTICS OF MASSACHUSETTS.

By SAMUEL W. ABBOTT, M.D.
of WAKEFIELD.

READ JUNE 8, 1892.

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THE NECESSITY OF A REVISION OF THE CLASSIFICATION AND NOMENCLATURE EMPLOYED IN THE VITAL STATISTICS OF MASSACHUSETTS.

In the following paper I do not propose to treat exhaustively of the subjects of the medical nomenclature and classification of diseases, but rather to introduce the subject in a suggestive manner with the view of asking the question whether any changes are necessary, and if so, what changes, in the classification and nomenclature now employed in the registration of deaths in this State.

What are the primary objects of the classification and nomenclature of diseases? An English writer has clearly said, "a good classification aids and simplifies the registration of diseases, helps toward a more easy comparison and knowledge of them, and toward the storing of experience respecting them, and facilitates the discovering of general principles from the collected, grouped and compared phenomena."[1]

In addition, medical nomenclature and terminology furnish the means for separating and distinguishing diseases and causes of death. Thorough registration must depend to a considerable degree for its efficiency upon the perfection of these means. The classification of diseases or causes of death differs little, if any, in its objects, from the great systems of classification employed in the different departments of biology. One of the greatest of modern teachers, Professor Agassiz, says, in commenting upon the object and utility of classification, "Have we, perhaps, thus far, been only the unconscious

[1] Elements of vital statistics. Arthur Newsholme, M.D., London, 1889.

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interpreters of a divine conception, in our attempts to expound Nature? And when in our pride of philosophy, we thought that we were inventing systems of science, and classifying creation by the force of our reason, have we followed only, and reproduced in our imperfect expressions, the plan whose foundations were laid in the dawn of creation, and the development of which we are laboriously studying; —thinking, as we put together and arrange our fragmentary knowledge, that we are anew introducing order into chaos? Is this order the result of the exertions of human skill and ingenuity, or is it inherent in the objects themselves, so that the intelligent student of natural history is led unconsciously by the study of the animal kingdom itself, to these conclusions, the great divisions under which he arranges animals being but the headings to the chapters of the great book he is reading?"

The intelligent student of medicine, and by the term student I would include the whole profession, (for we are students as long as we live, and the science of medicine has anything to teach us), the true student of medicine is in the same position as the student of nature.

An ex-president of this Society, in his annual address, stated his belief that "Disease is a part of the Plan of Creation," and if we accept this proposition, which modern researches as to the cause of disease seem still more strongly to confirm, it becomes our duty to learn as clearly as possible what the plan is, and what is its natural order of arrangement.

A uniform and conventional classification of diseases is desirable, in order that the medical profession everywhere, in all nations and lands, may the more intelligently and harmoniously unite in the study of the diseases of mankind. It is neither necessary nor is it possible that such classification should be immutable, since the progressive character of medical science is such as to require changes from time

to time. When such changes are made, however, they should be agreed upon as the conventional opinion of the profession.

Two centuries ago the classification and nomenclature of disease was widely different from that of to-day. Who can tell how far that of to-day differs from that which will become the admitted classification of two centuries hence? This want of uniformity interferes with the interpretation of medical statistics, especially when such statistics cover a long period of time. So far as the larger groups or divisions are concerned, there is no way of avoiding this disturbing cause.

The classification of the seventeenth century can scarcely be called a classification. In the mortality statistics of the city of London, compiled by Capt. John Graunt of the Royal Society, and embracing the period from 1629 to 1660, no classification is attempted, and while the nomenclature includes many terms which are still in common use, there are many others which contribute quite largely to the mortality-lists, which have no place in modern nomenclature. The following are a few of these terms, Impostume, Chrisoms, Jaw faln, Calenture, Planet, Flox, Livergrown, Woolf, Rising of the Lights. Some of these were indicative of a superstitious origin, others were merely the names of symptoms and not of diseases.

In the next century, the eighteenth, Cullen attempted to bring order out of confusion by proposing four general divisions or classes of disease. This was a decided advance beyond the confused methods of his predecessors, and his four classes of (1) The Pyrexiæ, (2) Neuroses, (3) Cachexiæ, and (4) Locales, served to a considerable degree as a basis for the modern nosology of the present century, that of the Royal College of Physicians, now in common use among English speaking physicians.

"It has been said that it is of slight consequence how we

arrange our knowledge, provided we do actually know what we think we know; and further that we should rest contented with the isolated fragments we can gather together, if we are careful to sift and verify them. It is obvious, however, that we cannot know any one thing accurately until we know it in its relation to others."[1] And herein lies the basis of that important branch of medical science known as diagnosis.

The tendency of the different sciences to overlap, and to trench upon each other's boundaries, increases with the progress of human knowledge, and there is scarcely any science which is not constantly borrowing from some other science. For example, the relation of zoölogy to geology, through the intermediate science of paleontology, may be quoted. Again, engineering has joined hands with chemistry on the one hand, and with physics on the other. Especially is this true with medicine, or the science of the human body in health and disease, which finds one handmaid in chemistry, another in botany, and allies itself with law in the department of medical jurisprudence. In recent years it has called to its aid the science of bacteriology to assist in the study of almost the whole group of infectious diseases.

The international importance of a conventional system of medical nomenclature and classification becomes yearly more apparent, and the subject forces itself to the front in the great scientific bodies which convene at regular periods throughout the civilized world. The International Medical Congress, the International Congress of Hygiene, and the International Statistical Congress have all deemed the subject worthy of consideration. It is in these bodies that the foremost men of science of different nations often come in contact, and opportunities are offered for comparing and unifying existing methods of work.

The following governments and authorities now have the

[1] Prof. W. Knight. Essay on Classification of the Sciences.

most complete and thorough system of registration of vital statistics :—

Great Britain, the collection of whose vital statistics is made by the Register General.

Germany, by the Royal Health office.

Italy, under the direction of the Department of Agriculture, Industry and Commerce. Professor Bodio.

France. Published by the Consulting Committee of Public Hygiene.

Austria. The Royal Central Statistical Commission.

Hungary. The Weekly Bulletins of International Statistics. Prof. Josef Körösi.

Belgium. The resumé of demography and medical statistics by Dr. E. Janssens.

Sweden. Government Medical Statistics.

Switzerland. Monthly and yearly bulletins of the Statistical Bureau of the Confederate Cantons.

To these should be added the mortality reports of the ninth, tenth and eleventh censuses of the United States (the latter being now in course of publication), and the registration reports of such of the older states as have established a system of registration.

Defects of our present system of registration. During the past ten years or more, several earnest attempts have been made, in which members of this Society have occasionally taken a prominent part, to secure in Massachusetts a Medical Practice Act, which would secure, both to the profession and to the people at large, such advantages as are enjoyed in other states having similar Acts in force. No greater argument could be found for the enactment of such a statute than that which may be found in a careful perusal of the certificates of deaths which are annually returned to the State authorities. Herein is also a standing argument for better medical education.

How may this defect be remedied? In the first place,

the nomenclature and classification should be made to conform to the progress of medical science. Secondly, more thorough medical education should be constantly encouraged. Thirdly, the administration of the collection of vital statistics should be improved. The first authority to receive and collect the individual certificates of death from undertakers and physicians is the registrar in cities and the clerk in towns. A decided improvement has been effected in recent years by adding the authority of the local Board of Health, so that the registrar or clerk becomes the supervisor or collector of certificates of death, while the Board of Health issues permits for burial. But unfortunately, in at least one hundred and fifty towns in the state, no Board of Health exists, except the *ex-officio* Board, the Selectmen, a Board which is never elected in consequence of its expert knowledge of vital statistics. In some of the southern countries of Europe local inspectors are appointed (leichenbeschauer), whose duty it is to inspect or visit every household where a death has occurred and see that the certificates of death are properly returned. An army of such officials would hardly be in keeping with our own form of government, but a decided improvement might be made by requiring that all certificates of death in small towns should be submitted to some district medical authority at stated intervals, such authority to have power to return all deficient or erroneous certificates for revision to the original signers. Several thousand such letters of inquiry are annually issued in England for the purpose of correcting the returns. In addition to these improvements, the entire work of registration should be placed under efficient medical supervision.

Let us now examine briefly the system of classification in general use in Massachusetts, which was copied almost identically in 1855 from that adopted in England, and is nearly the same as that advised by Dr. Farr, well-known as the foremost English authority in his day.

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The general divisions adopted are five in number:

1. Zymotic Diseases.
2. Constitutional "
3. Local "
4. Developmental "
5. Violent Deaths.

In this connection these should all be considered as groups of causes of deaths, and not as diseases.

For example, the entire fifth group is composed, not of so many names of distinct forms of disease, but of different modes of death by external causes, or in other words by violent means.

In the class of Deaths from Developmental Causes, *old age*, for example, a most common term in death certificates, cannot be called a cause of death, much less a disease. It is simply a period of life, and the use of the term in certificates is simply a confession of our inability to give an exact statement of the true cause.

Let us now examine the list more closely.

The first question I have to propose, is whether the term *zymotic* as a general name of the first class or division may not be supplanted by some term which is better adapted to the progress of Medical Science.

Does the term *miasmatic* properly describe the diseases of the first group of Class I.?

Does not typhus fever belong in the primary list?

Anthrax, fifty years ago, was a synonym for Carbuncle. Is it so considered at the present day?

Should not such terms as Metria and Nephria, now obsolete, be dropped from the list?

Should not the term Intermittent Fever be introduced into the primary list? (Ague scarcely covers the exact meaning.)

In Class II. of the list now in use (Constitutional Diseases) may be found the most destructive of all diseases, in

our climate and in our State (Tuberculosis). It was placed in this class according to the belief of the profession of fifty years ago. Does not modern observation, and a more intimate knowledge of its history, require that it should be placed in the First Class with other infectious diseases?

Under Class III. (Order 1), nervous diseases, we find at the head of the list the very indefinite term Cephalitis. Just what is meant by this term, it would be difficult to tell. It appears to be employed at present as a convenient omnibus into which are packed all deaths from diseases of the brain, which cannot be otherwise classified. More than six thousand persons (or over two per cent. of all deaths) are said to have died of Cephalitis in Massachusetts in the five years ending with 1890.

In the same list of nervous diseases no place is given to deaths from diseases of the spinal cord, except those which may be included in the meaningless &c. at the end of the list.

In the division of diseases of the organs of circulation, Class III., the deaths attributed to heart diseases appear to have increased from a total of 352 in 1850, to 3417 in 1890, and when these numbers are compared with the living population at those periods, we find that the actual increase amounts to nearly five-fold.

Two causes may be stated for this apparent excessive increase. One is the tendency in later years to more accurate diagnosis, on the part of educated and intelligent medical men. Many deaths were certified in the earlier years of registration, as deaths from dropsy, a term now very much less used, the disease being stated instead of the symptom. Another cause exists undoubtedly in the fact that in the past ten years the term "heart failure" has taken so strong a hold as to be employed in many certificates where no disease of the heart existed, either functional or organic. Some heroic remedy is needed for the cure of this evil.

These are but a small portion of the defects to which I have called your attention. Others exist in the employ-

ment of mere symptoms in place of the names of diseases, as in the terms paralysis, convulsions, dropsy, and also in the use of such indefinite terms as hemorrhage, tumors, &c. On the other hand it must be acknowledged that very great improvement has taken place in this direction in the past fifty years of registration. The ratio of deaths certified as having taken place from unknown or indefinite and ill-defined causes has diminished from 5.7 per cent. in 1868 to 1.2 per cent. in 1890.

The mortality attributed to diseases of the kidneys in Massachusetts in 1850 was only 18, while in 1890 it had increased to 1273. It is not to be understood that this enormous increase of more than sixty fold, and more than thirty fold when compared with the population, is an actual increase, but is due to better medical education, and especially to a more correct diagnosis. The same is true of diphtheria, a term which has no place whatever in the registration returns until 1858. We are not, therefore, to understand that diphtheria (a disease which is very carefully described both by Hippocrates and Aretæus) appeared for the first time in Massachusetts in 1858.

The registration of the causes of death in any community, whether it be a city or a nation, furnishes the basis for sanitary work, since it is by means of the comparison of the registration returns of different countries and different cities that we are enabled to judge of the comparative prevalence in them of those diseases which are, in some degree at least, within the control of mankind, and hence are preventible. A thorough and efficient registration offers to us the opportunity of studying the effect of many conditions upon the health of the people, such as the conditions of sex, different age-periods, density of population, occupation, civilization, intemperance, locality, seasons of the year, and other physical agencies. Hence it is, that the machinery of registration, the nomenclature and classification, should be in harmony with the progress of medical science.

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ARTICLE XXVIII.

THE RELATION OF BACTERIA TO INFLUENZA.

By HENRY JACKSON, M.D.
OF BOSTON.

READ JUNE 7, 1892.

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THE RELATION OF BACTERIA TO INFLUENZA.

As during the last year there have been many cases of influenza, grippe, which have led to further investigations and speculations as to the cause of this interesting disease, it seems desirable to again tax this Society with a brief account of the work done and the results obtained. The mere fact that in certain cases of influenza a bacillus has been isolated is not a factor of great importance, even though that bacillus differs in some of its characteristics from any germs previously described.

It is much more instructive to study the general course of the disease and observe the phenomena presented in its course, to determine if possible to what category of diseases we may relegate influenza. By comparing the symptoms of influenza with those of other diseases which we have good or fair reasons to believe to be dependent upon the invasion of micro-organisms, we obtain data sufficient to warrant us in classing influenza among the infectious diseases.

In the last hundred years several world-wide epidemics have occured, in each instance the disease having started in the east and travelled westward by gradual steps. In the epidemic of 1889–90, such was the geographical distribution of the disease; careful investigation showed that the disease spread gradually from east to west independently of atmospheric conditions, whether of wind or weather. Furthermore the disease spread along the lines and channels of human intercourse with the rapidity of human travel. In

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proof of the extension of the disease through the direct agency of infection from man to man, several factors of importance have been elicited. Firstly, isolated cases always appeared in a town or city before the disease became epidemic; this is demonstrated by the history of the epidemic as it appeared in small and isolated places, and by the universal testimony of physicians in large cities as gathered from their individual practice. At the beginning of the epidemic of 1889–90, we all of us saw a few cases which we did not recognize as essentially different from severe catarrhal colds, if I may use this expression, and only later did we recognize the fact that we had to do with a specific and wide-spread disease. Again this last year I saw on December 6th, in consultation, a case where the only permissible diagnosis was "a febricula," though the subsequent prostration showed that the patient had what in previous years we had recognized as a specific disease, influenza; not until the latter part of December were cases entered upon my books as influenza.

It has been demonstrated by investigation that it is possible that the disease is directly communicated from individual to individual, and on the other hand there is no proof that there is any causal relation between influenza and any atmospheric conditions. Perhaps the strongest practical proof of the infectious nature of influenza is to be found in the outbreaks of the disease on ship board; I give one instance in detail. [Proust La Semaine Medicale, 1890, No. 6.] The ship St. Germain sailed on December 2d from Saint Nazaire, and on the following day took on board at Santander a passenger from Madrid; this passenger had influenza the day after he came on board the ship. Four days later the surgeon had the disease, and in a few days it had spread widely through the ship's company. One hundred and fifty-four out of 436 passengers had influenza, also 47 sailors. As the whole ship's company was well before

the passenger was taken on board at Santander it seems reasonable to agree with Proust that he was the cause of the outbreak.

On the other hand Trudeau, recognizing the danger which influenza brought to persons with pulmonary tuberculosis, took great care to absolutely isolate his sanitarium from all possible sources of infection during the prevalence of influenza; the result was that all of his patients escaped, whereas the disease was very prevalent in the immediate neighborhood. Tuberculosis offers no immunity to the disease, but rather in these cases the disease proved itself exceptionally severe.

Influenza has in different epidemics manifested itself by attacking different organs; in epidemics previous to those of the last few years the chief local manifestations of the disease have been those of naso-pharyngeal catarrh and bronchitis. In the last two epidemics the local manifestations of the disease have not been so sharply defined; especially in the epidemic of 1889–90 the disease was divided into three essential types, the catarrhal, the gastro-intestinal and the nervous form. In spite of the varied seat of the local lesions in influenza, all forms have certain essential symptoms in common; at the height of the disease the general constitutional effects are in severity out of proportion to the local disease, prostration of greater or less degree follows the disease and convalescence is often protracted to a considerable period.

The matter has often been discussed as to whether influenza is to be considered as a contagious or miasmatic disease. Investigations of recent years tend to show that all acute epidemic diseases, whether classified as contagious, infectious or miasmatic, are dependent upon the growth in the body of some micro-organisms, whether they are bacteria, protozoa or some more highly organized species. It seems desirable and is certainly more simple to classify all such

diseases, whose essential etiological factor is found is a contagium vivum, as infectious. Certainly Flint's definition of an infectious disease as one caused "by an agent which under certain conditions is capable of unlimited increase or multiplication" covers every question that can be raised as to the cause of the disease under consideration.

As in other infectious diseases, so in influenza, we find that certain diseases are often associated with influenza, either intercurrently or as sequelæ; a predisposition to infection from other diseases appears to be produced. In the epidemic of 1889–90, but more frequently in 1890–91, many cases of tonsillitis of the follicular type were observed in connection with influenza, cases whose clinical history left no reasonable doubt but that influenza was the essential disease, and the acute follicular tonsillitis but a complication.

Acute catarrhal nephritis, as evidenced by albuminuria and casts, is not infrequent; chronic nephritis is an occasional sequela, as I have seen in a case that I have followed with care since the epidemic of 1889–90. I saw several cases in which the duration of albuminuria and casts and the occurrence of slight œdema made the assumption probable that the kidney lesion had passed beyond the stage which may be justly described as catarrhal nephritis. The most important complication met with in influenza is pneumonia; its frequency in influenza cannot be denied. Dr. F. C. Shattuck's paper on "The Relation of Pneumonia to Influenza in Boston" in the epidemic of 1889–90, demonstrates the association of the two diseases in Boston. I desire to quote from Dr. Shattuck's paper a few remarks.

Table I.—Deaths from Pneumonia reported at the Boston City Hall for the months of December and January, 1884-5, 1889-90 inclusive:

Year	'84–'85	'85–'86	'86–'87	'87–'88	'88–'89	'89–'90
Dec.	141	74	113	95	68	105
Jan.	103	83	91	183	92	332
Total	244	157	204	278	160	437

This table shows us that almost twice as many deaths occurred in Boston during December and January, 1889-90, as in any previous five years during these months. Taking the month of January alone the average number of deaths is 110, while in January, 1890, there were 332 deaths due to pneumonia. Dr. Abbott's report on the epidemic of influenza of 1889-90 shows the same general ratio throughout the State; from almost every town the report is made that pneumonia was much more frequent than in previous years. Similar statistics may be found in the English collective report and in the French and German articles.

Careful clinical observation of the cases of pneumonia as seen in connection with influenza has led all observers to express the opinion that the pneumonia was not to be considered as the direct result of the influenza, but as an intercurrent disease; the influenza is the predisposing, not the primary cause of the pneumonia. Numerous bacteriological examinations have been made as to the etiology of pneumonia as associated with influenza, and the results bear out the opinion expressed by the clinical observer that the pneumonia is not due to the influenza *per se*, as the same micro-organisms are found in pneumonia following influenza as in acute fibrinous pneumonia of the ordinary type.

All text books of general medicine with which I am familiar, in speaking of the etiology of pneumonia, mention the bacterium described by Friedlander as an encapsulated coccus, but which is more properly a bacillus, as the organism which is generally formed in acute fibrinous pneumonia. This is a mistake. Friedlander, in 1883, described the organism known by his name and claimed that it was the cause of acute fibrinous pneumonia. In 1884 Frænkel described an organism morphologically very similar to the bacterium described by Friedlander, but entirely distinct in its biological characteristics. This is the organism known to science as the pneumococcus, and all subsequent observa-

tion has corroborated the statement of Frænkel that it is found almost invariably alone or associated with other micro-organisms in acute lobar pneumonia. This is not the place to discuss the question whether this organism is the chief etiological factor in the creation of pneumonia, but there is no scientific evidence in favor of the bacterium described by Friedlander. The pneumococcus of Frænkel bears various names, "Diplococcus of pneumonia," "The pneumococcus," "Lancet shaped coccus of Talamon," etc. In 1886 Weichsellaum published the results of two years of very careful work on the etiology of pneumonia; in 129 cases he found the pneumococcus 94 times. I give a table of the organisms found in acute pneumonia as collected from the works of Weichsellaum, Wolf, Netter, Welsh, Banti and others:

No. of Cases.	Frænkel.	Frænkel with other pathogenic Germs.	Friedlander.	Strep. & Staph. Cocci.
391	288	7	62	26

Fifty of the sixty-two cases in which the Friedlander bacilli were found are described by Friedlander himself; so far as I know he has not written any article in support of his theory advanced.

We may consider that it is proved that the pneumococcus is almost always found in primary acute fibrinous pneumonia, whether or not we allow that this organism is the primary and sole etiological factor in the causation of this disease. Many examinations have been made as to the organism found in pneumonia accompanying or following influenza, and I wish to draw the attention of the Society to some of the most important contributions to this subject. Jaccoud (La Lemaine Medicale, 1890, No. 7).

Twelve cases of pneumonia complicating influenza. In all the pneumococcus of Frænkel was found in the sputum, also several streptococci and the staphylococcus aureus were isolated.

G. See (Compte's Rendus. Tome CX. 1890, p. 197).

The results may be tabulated as follows:

1. In all cases of pneumonia following influenza the pneumococcus found but not in pure culture.

2. In these pneumococcus found in pure culture in blood taken from the spleen by puncture.

3. The identity of the organism obtained from the spleen was demonstrated by the inoculation of animals.

4. G. See draws attention to the fact that the occurrence of the pneumococcus in the spleen demonstrates that pneumonia is a general infectious disease and not a local pulmonary disease.

Weichsellaum (Wien. Klin. Wochenschrift, 1890, Nos. 6–10).

In ten autopsies on patients who died of influenza he found acute suppurative processes in the sinuses connected with the nose; in seven of the cases there was pneumonia. In all these acute processes Weichsellaum found pneumococci, and in some of them streptococci or staphylococcus pyogenes aureus. He does not consider these organisms as the cause of the influenza, but simply as the cause of the acute processes associated with the influenza.

Prudden (New York Med. Record, 1890, p. 169).

In six cases of pneumonia following influenza the result was as follows:

1 pneumococcus in pure culture.

4 pneumococcus with streptococci and staphylococcus.

1 streptococci and staphylococcus.

I might give many more similar cases. The evidence is conclusive that in cases of croupous pneumonia associated with influenza, the same germ, the pneumococcus, is found as in cases of pneumonia occurring independently of influenza. The investigations of bacteriology lead us to the same conclusions which have been reached by the clinical observation of cases, namely, that the pneumonia found in

cases of influenza is not the direct result of the disease *per se*, but that the influenza is the predisposing cause of the subsequent pneumonia.

Influenza is clinically and socially a disease of much importance and interest because of the severe and often prolonged disturbances of the system produced by it. The general symptoms are in severity out of all proportion to the local lesions demonstrated by physical examination. At the outset of the disease we have high fever, severe headache or backache, sleeplessness, or vomiting and diarrhœa; one or all of these symptoms may be present in an individual who on physical examination presents only the evidence of a pharyngeal catarrh or a bronchitis of moderate severity. As sequelæ of the disease we find as a rule protracted convalescence, often marked prostration, in some cases inability for physical or mental work, and occasionally neuritis or some systemic nervous disease. Investigation in other infectious diseases has demonstrated that these symptoms are dependent upon ptomaines, toxic bodies produced by the activity of the bacteria which are the cause of the disease. To my mind the strongest evidence in favor of the infectious character of influenza is to be found in the clinical evidence of the presence of some severe general toxic agent. Reasoning by analogy offers the only proof of the existence of such a ptomaine, as no work has been published as to the presence of any poisonous alkaloid in influenza cases.

Bacteria probably produce their injurious effects in infectious diseases in two distinct ways, mechanically, and secondly by the ptomaines produced by their growth in the body. The bacilli of anthrax and tetanus may be chosen as representing the two extremes of these methods of action. If a susceptible animal is inoculated with the bacilli of anthrax it dies in twenty-four to forty-eight hours, and the minute blood-vessels are found to be absolutely filled with

the large bacilli, often to such an extent that many of the capillaries are ruptured. The very number of the bacilli present are sufficient to mechanically interfere with the circulation, and produce a dearth of oxygen on account of the strong affinity of the bacilli for oxygen. On the other hand if an animal is inoculated with tetanus it dies just as soon, but no bacilli are found except at the seat of the inoculation. In the one instance the bacilli have caused death by mechanical interference with the oxygenation of the blood, in the other by the formation of a virulent poison. In man the anthrax bacilli do not always multiply with the rapidity that they do in more susceptible animals, and as the process is a slower one we often have symptoms of a general septic disease dependent upon the ptomaines produced by the bacilli.

Reasoning by analogy from the facts as established in other infectious diseases, we have good reason to suppose that the general symptoms of influenza, so varied in character, are all dependent upon some as yet unknown poison produced by the growth of micro-organisms.

As influenza presented many symptons suggestive of an infectious disease on the first wide-spread appearance in 1889-90, numerous and careful bacteriological examinations were made to isolate if possible some specific germ. Many germs were isolated, but no one germ was found in a sufficient number of cases to warrant the conclusion that it might be considered as the cause of the disease. Such confusion existed that Koch expressed the opinion at the Tenth International Congress, that we must probably look for the etiological factor of the disease among the protozoa rather than among bacteria. In the light of the subsequent studies of Pfeiffer (Jan. 1892), it is probable that several observers found the germ which is now suggested as the possible etiological factor in the causation of influenza. Babes of Bucharest made the most careful experiments

which are published at length in the Centralblatt für Bacteriologie for 1890, vol. 7; he isolated seventeen germs, several of which in their morphological and biological characteristics resemble very closely the germ recently described. As a result of their investigations Weichsellaum, Prior, Strümpell, Prudden and others, all expressed the opinion that acute intercurrent diseases in influenza were to be considered as complications, and not as direct manifestations of influenza *per se*. Subsequent investigation has only strengthed this opinion. Ribbert alone (Deutsche Med. Wochenschrift, 1890, No. 15) expressed the opinion that the streptococcus pyogenes probably stood in an important etiological relation to influenza; his only reason offered in substantiation was that the streptococcus pyogenes was almost always found in cases of influenza. I should say that this reasoning was about as fallacious as that of the author who observed that cats were invariably found in families where cases of scarlet fever appeared.

In the Deutsche Med. Wochenschrift, 1892, No. 2, Pfeiffer published a preliminary report on "The Bacillus of Influenza," based upon work done at the Berlin Institute for Infectious Diseases. He published only his results, and reserves for a subsequent date the publication of the details of his work. I here insert practically a translation of the notes published by Pfeiffer, and a review of work described by his colaborators, Canon and Kitisato.

Pfeiffer.

1. In the purulent bronchial secretion of all cases of inflenza a definite bacillus was found. In uncomplicated cases these rods are the only bacteria present and are found in enormous numbers; often found in the protoplasm of pus cells, and may extend into the peribronchial tissue; in two cases found in the purulent secretion of the pleura.

2. These bacilli are found only in influenza, as shown by numerous analyses in cases of bronchitis, pneumonia and phthisis.

3. They disappear as the influenza passes off.

4. Pfeiffer saw the same bacilli in the epidemic of 1889-90, in the sputum in large masses.

5. They are very fine rods, similar to the bacilli of mouse septicæmia, but not as long; often arranged in threads. They are difficult to stain; they may be stained by a hot Ziehl solution or a hot Lœffler solution; they are more stained at the ends than in the central portion, so Pfeiffer thinks they have been seen by other observers who have taken them for cocci. [This describes an organism often called a "Belted organism."]

6. They grow in 1½% sugar agar as very fine colonies; they cannot be carried on beyond the second generation.

7. Positive results on monkeys and rabbits. (What the results are remains a blank.)

8. "From these results I consider myself justified as looking upon these bacilli as the cause of the influenza."

9. Infection in influenza is probably through the medium of the sputum.

Kitisato. (Same Journal as above.)

The colonies are so small and transparent that they may have been overlooked by previous observers. He says he has obtained pure culture of the organism directly from the sputum by a method employed to cultivate the bacilli of tuberculosis from sputum.

The colonies show no tendency to run together, but remain separate, offering a strong point in differential diagnosis. Kitisato has never seen this organism in other cases, though his experience has been large in analyzing the sputum in many cases of bronchitis, tuberculosis and pneumonia.

Canon. (Same Journal as above.)

Canon has found the bacillus in the blood, and in No. 3 of the Deut. Med. Woch. reports that he has cultivated the bacillus from the blood. He employs a special stain:

Conc. Aqueous Meth. Blue 40.
Eosin .5,70% alc. 100 parts 20.
Aquam 40.

The specimens remain in this solution three to six hours at 36° Cent., and are then washed in water. Canon reports that the bacillus may be carried on for several generations if the cultures are renewed every seven days.

Babes (Deutsche Med. Wochenschrift, Feb. 11, 1892) draws attention to the fact that in the epidemic of 1889–90 he found in several cases of uncomplicated influenza very fine rods in large numbers; their growth on glycerine agar was poor. Babes considers that these organisms are the same as the organisms described by Pfeiffer. Also Klein (British Medical Journal of Jan. 23, 1892) reports that in 1889–90 he found in the blood of influenza cases fine bacilli, morphologically and biologically identical with the organisms described by Pfeiffer.

We have the following facts which strongly suggest that influenza is an infectious disease:

1. Its appearance in epidemics; the manner in which it spreads from individual to individual.
2. The symptoms suggestive of some toxic influence.
3. Reduction of the general system and thereby induced susceptibility to disease.
4. A germ has been discovered which may be the cause of the disease.

With all due respect to the exhaustive and exhausting investigations of the scientific observers, I cannot but close my paper with a quotation from Mrs. Thrale's Journal. In allusion to the rage for scientific experimentation in 1811 she writes: "Never was nature so put to the rack, and never of course was she made to tell so many lies."

May not this be as true now as it was eighty years ago?

ARTICLE XXIX.

PNEUMONIA IN THE RECENT EPIDEMICS.

By WILLIAM E. FAY, M.D.
OF BOSTON.

READ JUNE 7, 1892.

PNEUMONIA IN THE RECENT EPIDEMICS.

PUBLISHED reports of inquiries among American practitioners have indicated pneumonia as the disease most increased in frequency and fatality during epidemic influenza. Increase and severity of bronchitis stands in close parallel.

These two affections, which comprise nearly the sum of the acute diseases of the respiratory organs, are associated as a single factor in most reported statistics in this and other countries, so that it is only by the comparison of them in this association with other causes of death that we can get an idea of their importance from a survey of the available evidence.

After such a comparison we will try to distinguish a proportion between the two diseases and study pneumonia more closely in some of its aspects.

In the exhaustive report[1] by Dr. Abbott of the State Board of Health upon the epidemic of 1889–90, the increased mortality from pneumonia and bronchitis in nine Massachusetts cities is represented by a curve traced to rise, at its highest point, 300% over the curve for the preceding free year. Add to these the other twelve cities tabulated in that report and representing 6,000,000 people, and the rise is nearly as great. The per cent. of increase in those influenza weeks, from December 14 to February 8, 1889–90, over the previous free year, is for the total mortality 128%, while the per cent. of increase in the deaths

[1] The Influenza Epidemic of 1889–90. Public Document No. 34. January, 1890, p. 382.

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from bronchitis and pneumonia is 183%, showing the greater proportion due to the latter cause in these American cities.

It is stated in the Reports of the Imperial Board of Health[1] of Germany for this first epidemic, that "The marked increase of the death rate during the epidemic was shown mostly to be in the acute diseases of the breathing organs." For the last epidemic, from figures there given, we gather the facts for twenty-three large cities of Europe. The average weekly death rate per 10,000 of the population for the months of November to February inclusive, in which influenza reigned, was from acute diseases of the respiratory organs almost fifteen (14.92), while the average for those weeks for ten years ending in 1890 was but little more than six (6.17), showing an increased mortality of 241%.

The increase in the total mortality was relatively much less, 150%.

To such an extent, then, are we able to fix upon these causes the responsibility for deaths during the influenza. So it was that Arbuthnot in former times noticed "inflammations of the lungs, dangerous and often mortal.[2] And Dr. Rush a century ago mentions that in most of the cases which terminated fatally the patients died of pneumonia.[3]

In order to distinguish a proportion between pneumonia and bronchitis a limited comparison may be instituted. According to the returns to the Board of Health of this city, the week ending January 2d was found to mark the highest mortality from pneumonia this past winter. That of bronchitis was a week later. In the previous epidemic the greatest mortality of each was in the same week. In London the conditions were just reversed. If the mortality

[1] Kaiserliches Gesundheitsamt. Das Auftreten der Influenza in winter 1891–92, p. 3.
[2] Annals of Influenza. Sydenham Soc., p. 37.
[3] Ibid.

of pneumonia was due to broncho-pneumonia following bronchitis there would have been some other than the accidental relation in time.

How much greater fatality arises from pneumonia than from bronchitis in this locality, under influenza, is manifest from a view of the accompanying charts, as also a current view of the mortality of each from season to season for the years since the records of the Board of Health were kept in their present complete form.

Among the four and a half million of people of London, contrariwise, we learn from reports to the office of the Registrar General that there is a constant predominance of mortality from bronchitis, and that under epidemic influence it is most exaggerated.

The behavior of the two diseases as regards fatality in that climate last winter is illustrated by the accompanying tracings. The curve for bronchitis rises to an acme of 240%, for pneumonia to 206%, over the average for the same weeks taken for a period of ten years just preceding. And we must note that the rise of each precedes by at least two weeks the recognition of the development of simple influenza as a cause of death. This may be partly explained in that at first diagnosis of influenza was probably made by exclusion, a typical symptom of cardiac or pulmonary disease being found warrant for the death return under some other name, until by its universality the epidemic had engaged fuller attention.

It has been observed by Dr. G. B. Shattuck that "if the early increase in deaths from pneumonia was dependent upon epidemic influenza, the epidemic this season should have manifested itself earlier than two years ago," whereas it was found to be a little later.[1] And the question arises whether any remainder of influenza poison could have been

[1] Pneumonia in Boston during the Recent Epidemic of Influenza. Boston Med. and Surg. Jour. Vol. cxxvi., No. 21, p. 519.

in lurking existence with us since the former epidemic which may have intensified the renewal usual to be seen in the prevalence of pneumonia in winter months, and which we saw before the development of La Grippe. That there was some existence in attenuated form was shown by a larger number of deaths attributed to it in the State of New York during the spring months of a year ago, also in Norway and Sweden, and in England. And we quote from German Health Reports that "one is forced to the belief that also after the Spring of 1890 the epidemic here and there of weaker intensity was still present, and in the late Fall of 1891, under inviting conditions, found a greater distribution."

So recently there has been some continuance or a brightening of the embers of the last epidemic influence as has been observed by Dr. J. B. Ayer.[1] How the poison acts is perhaps not clear from clinical observation.

It seems to be as insidious as that of malaria. And one queries whether its undeveloped presence might not be felt by the mycrophyte of pneumonia before its recognition by men in its maturer development as a disease.

As a study of the falling curves I have reduced those for a number of large cities during both recent epidemics to give a composite view.[2]

The acmes of each representing the height of the epidemic in each locality taken, being placed in the same meridian, we have to observe a very close correspondence between them. The general decline of the line for acute diseases of the respiratory organs is a little more tardy than that for the total mortality. This may only express the sum of fatal cases of pneumonia and bronchitis which developed after an attack of influenza, and in consequence of

[1] The third year of the Influenza epidemic. Boston Med. and Surg. Jour. Vol. cxxvi. No. 22, p. 543.

[2] In the second group, in some cases only approximate figures could be obtained.

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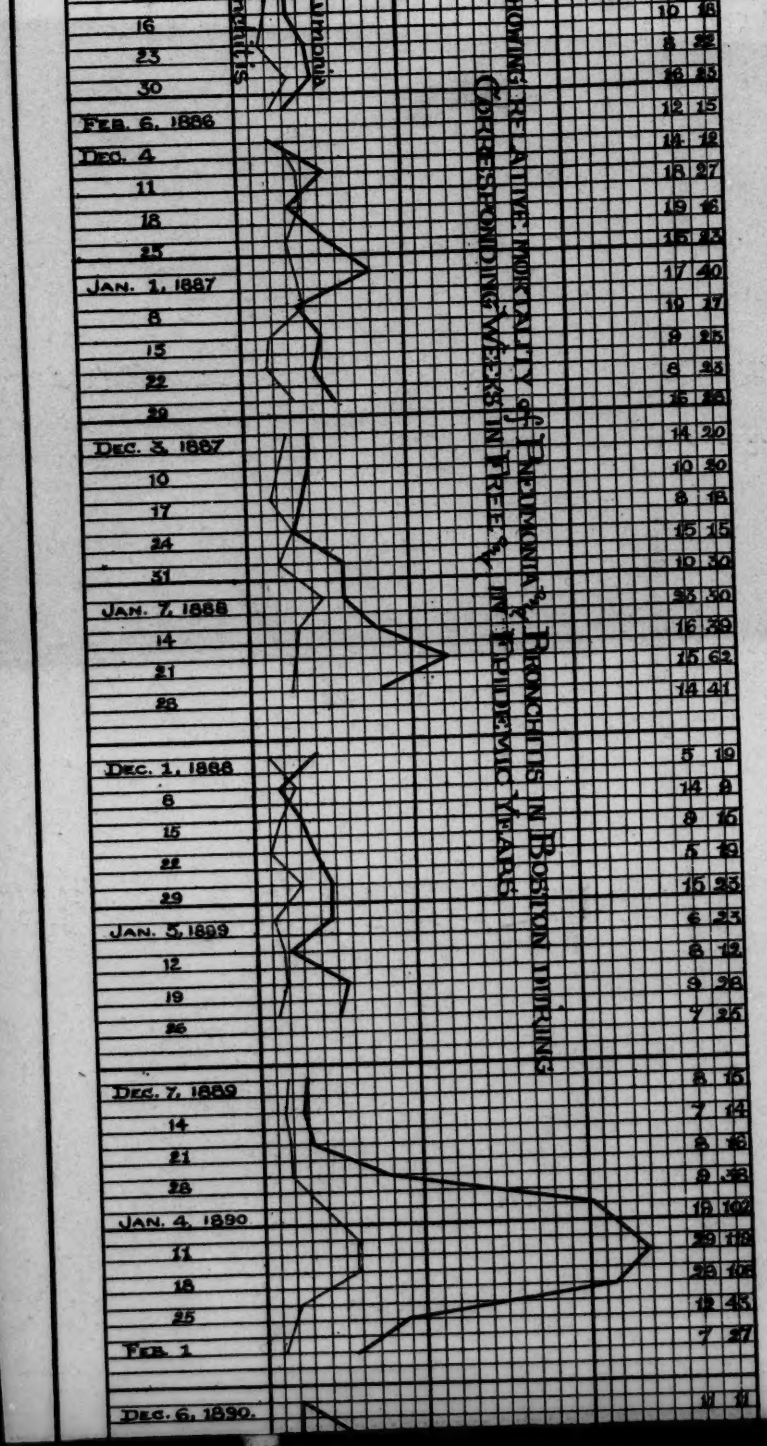
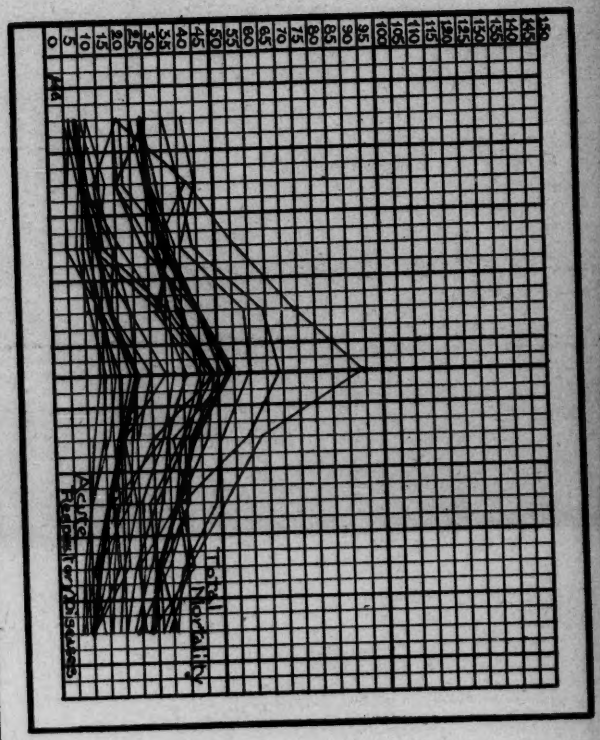
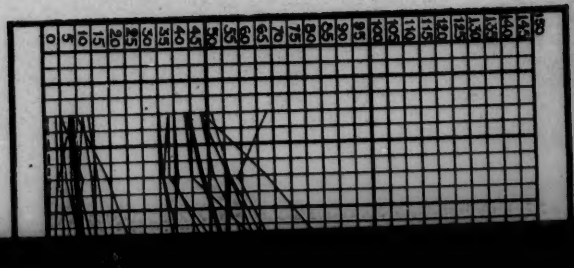
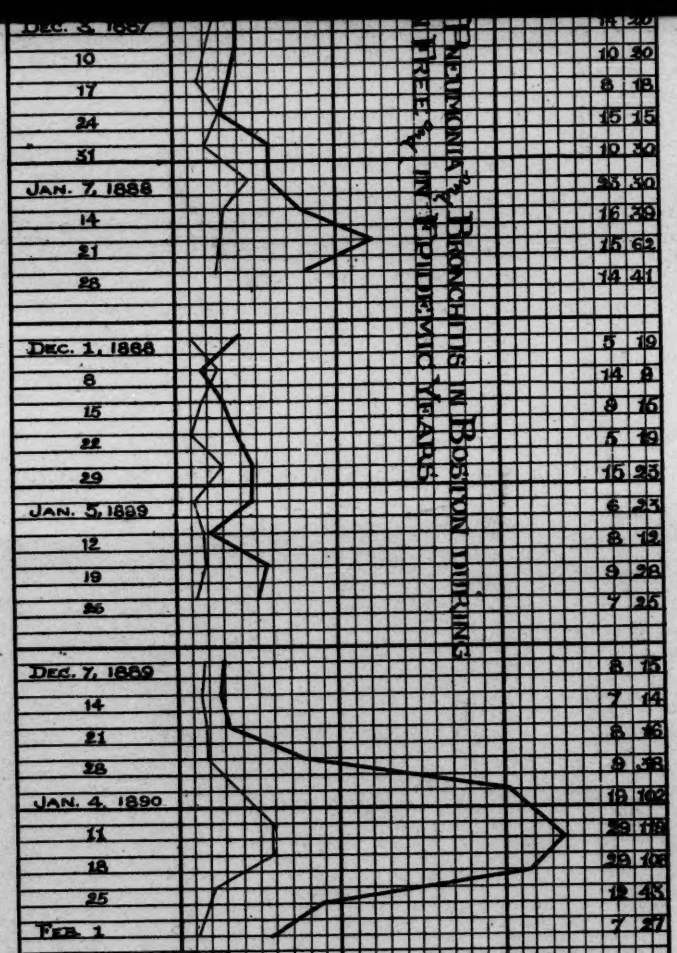
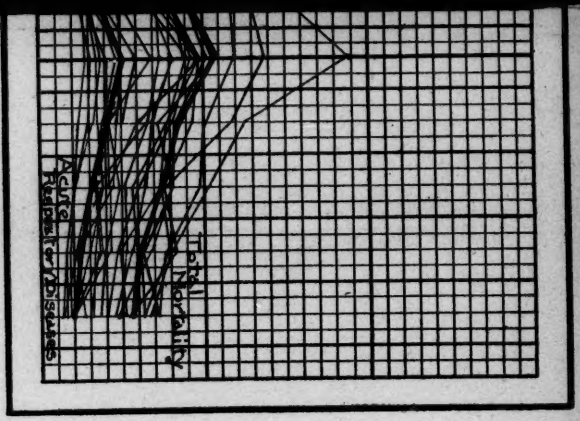


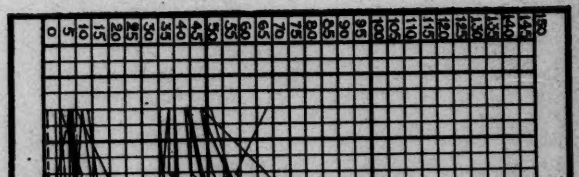
CHART SHOWING RELATIVE MORTALITY OF PNEUMONIA & BRONCHITIS IN BOSTON DURING CORRESPONDING WEEKS IN FREE & NON-EPIDEMIC YEARS.
Pneumonia
Bronchitis
16
23
30
Feb. 6, 1886
Dec. 4
11
18
25
Jan. 1, 1887
8
15
22
29
Dec. 3, 1887
10
17
24
31
Jan. 7, 1888
14
21
28
Dec. 1, 1888
8
15
22
29
Jan. 5, 1889
12
19
26
Dec. 7, 1889
14
21
28
Jan. 4, 1890
11
18
25
Feb. 1
Dec. 6, 1890.
10 18
8 22
16 15
12 15
14 12
18 27
19 16
15 22
17 40
10 17
9 25
6 23
15 20
14 20
10 30
8 18
15 15
10 30
25 30
16 39
15 62
14 41
5 19
14 9
8 15
5 19
15 25
6 25
8 19
9 28
7 25
8 16
7 14
8 18
9 38
19 102
29 118
28 106
12 45
7 27
11 41


Pneumonia
Bronchitis
Total Mortality




Pneumonia and Bronchitis in Boston during three Epidemic Years
Dec. 3, 1887
10
17
24
31
Jan. 7, 1888
14
21
28
Dec. 1, 1888
8
15
22
29
Jan. 5, 1889
12
19
26
Dec. 7, 1889
14
21
28
Jan. 4, 1890
11
18
25
Feb. 1
10 20
8 18
15 15
10 30
33 30
16 39
15 62
14 41
5 19
14 9
9 15
5 19
15 25
6 23
8 12
9 28
7 25
8 15
7 14
8 16
9 38
19 102
29 118
28 106
12 45
7 27


Acute Diseases of the Respiratory Organs
Deaths from Consumption


0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150

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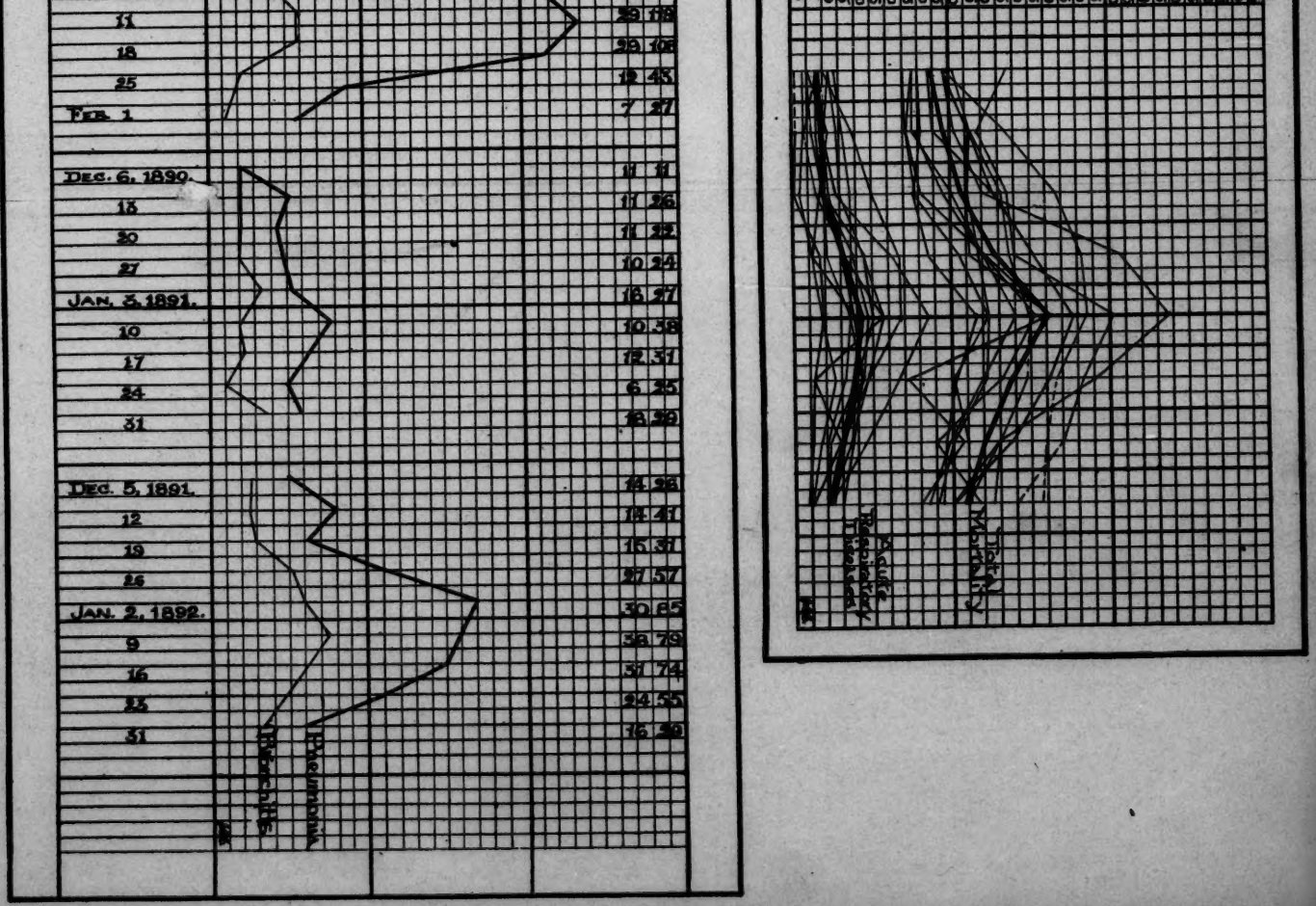
11
18
25
Feb. 1
Dec. 6, 1890.
13
20
27
Jan. 3, 1891.
10
17
24
31
Dec. 5, 1891.
12
19
26
Jan. 2, 1892.
9
16
23
31
29 18
29 10
19 43
7 27
11 11
17 26
11 22
10 24
16 27
10 38
12 31
6 25
18 39
14 28
14 41
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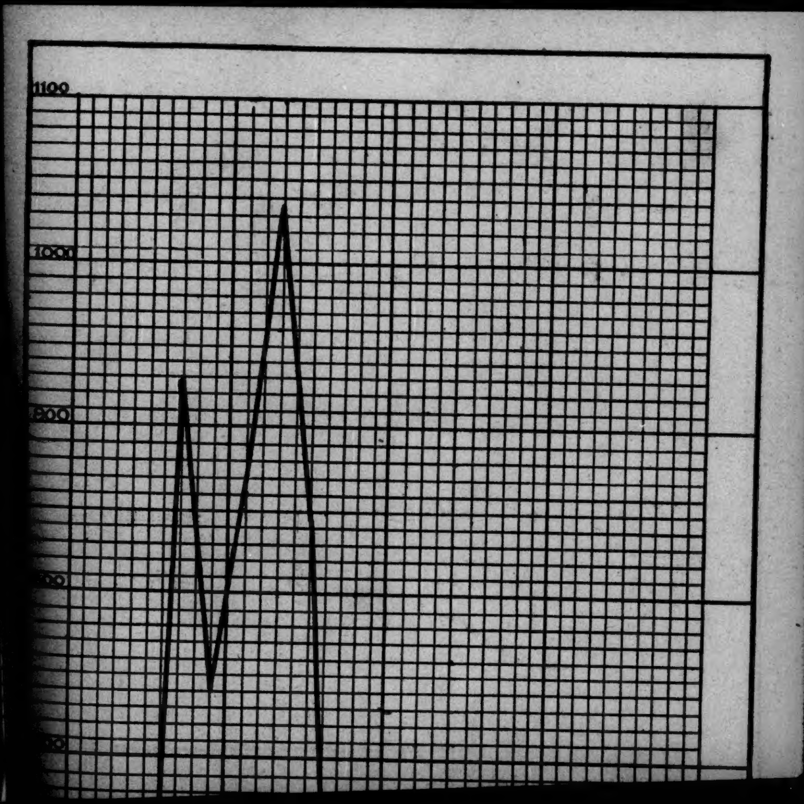
27 57
30 65
38 79
31 74
24 55
16 29



1100
1000
900

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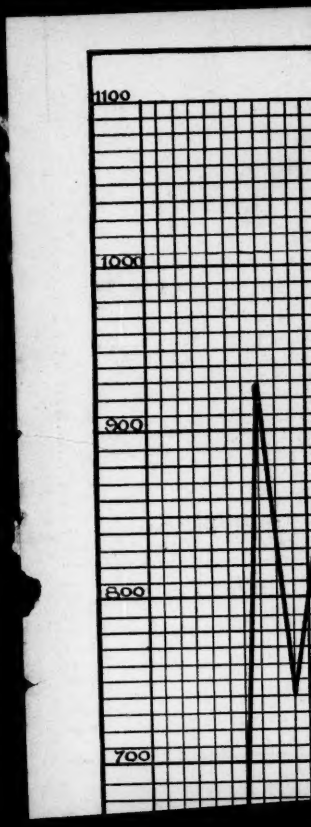

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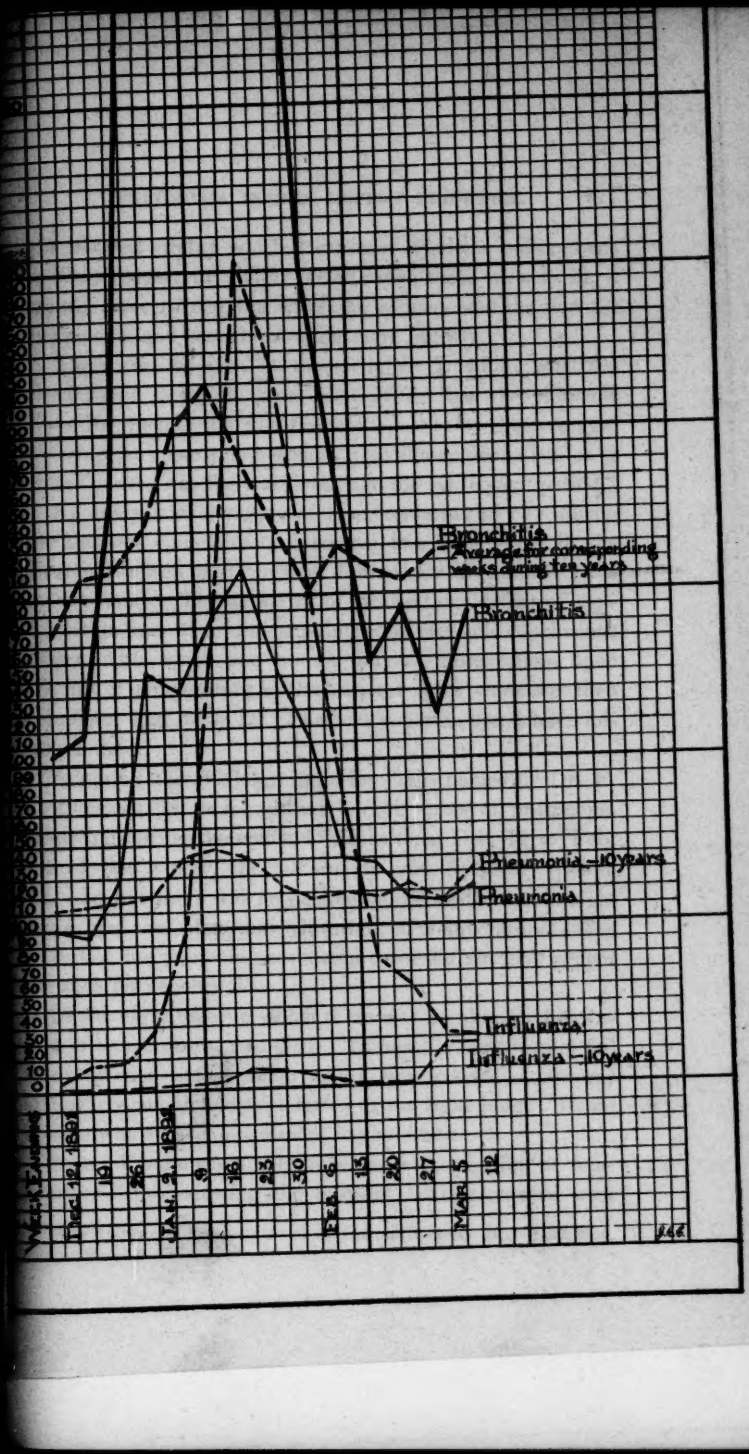
Bronchitis
Average for corresponding weeks during ten years
Bronchitis
Pneumonia—10years
Pneumonia
Influenza
Influenza—10years
Dec. 12 1897
19
26
JAN. 2, 1898
9
16
23
30
FEB. 6
13
20
27
MAR. 5
12
166

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the lowered vitality which it caused. Had the poison been a direct cause, or simply acted upon those already ill, it should have turned the scale the sooner, and the line for pneumonia and bronchitis fallen more quickly.

There can be seen in the chart for London, what has been found generally true, that at the last the epidemic lines for pneumonia and bronchitis fall below the average, showing, as some one has said, that the epidemic has as it were "picked out the bad lives from the subsequent period."

An analysis of the cases of pneumonia in this city during the last two epidemics of influenza has been given in the Boston Medical and Surgical Journal for May 26th, by a master hand. The questions of localization, extent of consolidation and other clinical points were met, and conclusions drawn with which one cannot differ. Observations upon the fall of temperature in the hospital cases were not then complete, and with Dr. Shattuck's permission I have followed them.

Adopting the 36 hour limit for crisis named by Dr. F. C. Shattuck,[1] it is found that in 100 cases of pneumonia occurring during the epidemic weeks from Dec. 12 to Feb. 1st of last winter, the fall was by crisis in 38, by lysis in 32. In five there was no decline before death, and in eight there was no abnormal elevation of temperature. The record of the remaining seventeen cases did not give proper grounds for conclusions.

Of the eight cases in which there was no abnormal elevation of temperature, two died. In one the temperature fell below normal before death, there was a systolic murmur and nearly complete consolidation of the right lung. Renal disease was an accompaniment in the other.

Some of these cases may have experienced a fall of temperature before entering the hospital. They entered with

[1] The Relation of Pneumonia to Influenza in Boston. New York Med. Jour., vol. i., p. 650. 1890.

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well marked signs of consolidation. However, pneumonia has been reported without elevation of temperature, even including the initial congestion.[1]

Weak and valvular heart sounds, and sounds accompanied by murmur, were recorded as often in cases not preceded by influenza symptoms as in those so preceded. They were more frequently mentioned in the cases in which the temperature fell by lysis, than in those in which it fell by crisis. The ratio was about two to one.

The sputa was recorded in about an equal number of those cases preceded and those not preceded by influenza symptoms as being thin, tenacious or frothy. A brown color was mentioned oftenest in those cases not preceded, and "streaked" or "bloody" most often in cases preceded by influenza symptoms. The occurrence of chills appeared to be entirely irregular.

Evidence of infection was not found further than that influenza had sometimes been present in the house from which pneumonia came. But in Dispensary practice I have seen a man recover just sufficiently to get feebly up when his wife required his place and care for the same pneumonia with which he had suffered. There was no one else in the family. That there is a considerable class of cases during an epidemic of influenza in which one observes in some portion of the bases of the lungs posteriorly a scarcely appreciable dulness, with roughened or broncho-vesicular respiration of no great intensity, voice sounds often but little modified, and moist râles everywhere, fine and sticky below, coarser above and often there accompanied by some dry râles, is, I think, a matter of common experience. Such cases are often recorded under the diagnosis of bronchitis and influenza. They are referred to by some authorities as "what is called pneumonia,"[2] "seldom an honest

[1] S. H. Drew. Practitioner. 1891.
[2] Da Costa. Braithwaite. CI. p. 5. 1890.

pneumonia"[1] and "the condition of engorgement rather than consolidation."[2] I have been taught to regard them as spurious pneumonia.

The clinical evidence has seemed to me to indicate that true pneumonia, which is shown to be more frequent and fatal during an epidemic of influenza, is not other than the pneumonia of other seasons; more frequent, perhaps, from the addition of cases due to a predisposition, from lowered vitality following some form of its influence; and more fatal because the pneumococcus, sensitive to its environment,[3] behaves with greater virulence in its presence.

DISCUSSION.

Dr. A. L. Mason, of Boston:—Although this subject has been often discussed of late years, the papers just read have been of great interest, that of Dr. Jackson from the bacteriological, and Dr. Fay's, with its valuable charts, from the epidemiological point of view. I have little to add to the general discussion, but, from the practical side, will offer the following notes derived from the personal experience of the last year.

During the past three years we have had occasion to realize, especially in the Boston City Hospital, the great mortality from acute lung diseases which influenza brings in its train, and although there have been periods of remission, when influenza may be said to have prevailed sporadically only, I think that we have never been entirely free from it since its first appearance in December, 1889. In that year mid-winter was the most serious time. The same is true of the present year, as was pointed out by Dr. G. B. Shattuck in his article on "Pneumonia in Boston during the Recent Epidemic of Influenza," published in the Boston Medical and Surgical Journal, May 26th. But a year ago at this

[1] Prof. Whitla. British Med. Jour. 1892, p. 1287.
[2] H. A. Hare. Therapeutic Gazette, Feb. 15, 1892.
[3] Burden Sanderson. Quoted by Radcliffe in Archives Pædiatrics, June, 1892, p. 422.

time, or a little earlier, there were many severe cases of influenza in Boston. It was a spring visitation or exacerbation of the prevailing epidemic influence, and a considerable mortality from acute lung diseases persisted until the middle of June. This opinion is in accord with that of Dr. James B. Ayer as expressed in his interesting article entitled "The Third Year of the Influenza Epidemic," in the Medical and Surgical Journal, June 2d.

Pneumonia. Confining ourselves to the subject of pneumonia, however, it is probable that a large hospital service is usually a fair index of the prevalence of acute disease in a community. At the City Hospital from Oct. 1, 1891, to June 1, 1892, one tenth of all the cases admitted to the service under my charge were cases of acute lobar pneumonia. Excluding cases of spurious and abortive pneumonia, they were eighty-eight in number, and presented a great variety of interesting features and complications.

The usual characteristic types, sthenic, asthenic, typhoidal and alcoholic, as pertaining to the young, the old, the feeble and the drunkard, were noticeable, and it was among the last three classes, especially the alcoholic, that the mortality chiefly occurred. The death-rate has been high, as was noted in Dr. Shattuck's article above referred to. This hospital death-rate, however, of one third or more, is caused mainly by intemperance, and the large number of old, broken down subjects. The other cases do very well. But the frequency of the first of these special dangers may be inferred from the fact that 2.5% of all admissions to my service, and one fifth of all the deaths, were caused by alcoholism. Most of these deaths were also attributable to pneumonia, but it was the combination with delirium tremens that killed. Few such cases can be sustained until the crisis is reached. The strength gives way under the exhausting influence of insomnia, delirium and dyspnœa. Chloral and other hypnotics must be used with caution. Oxygen is of no value, and the other cardiac stimulants meet with little response.

Besides this bad class of cases I wish to refer also to those with typhoidal symptoms; to some cases of apex pneumonia; and to others which were followed by empyema.

Tyhoidal Symptoms. The term "typhoid pneumonia" is, I think, an objectionable one. It usually refers to cases

of asthenic pneumonia with low, muttering delirium, rather than to the occasional cases of typhoid fever with pneumonia superadded. But there may sometimes be a good deal of perplexity in deciding whether, in a severe case of pneumonia, typhoid fever also is present, or not.

Empyema. I will refer to another point which causes difficulty in diagnosis, and that is the frequency with which empyema has followed pneumonia in these years, sometimes even accompanying the acute stage, before the crisis. Oftener, a few days after crisis, or during the process of lysis, the patient is found to be doing poorly, the temperature again rises, and examination shows an unresolved lobe, with flatness and distant bronchial breathing at the base. The exploring needle finds pus or a cloudy fluid which soon becomes purulent. Sometimes this is a latent process and causes little change in the physical signs until the amount of fluid is large, and no marked rise of temperature.

Again, in cases which come late we may be in doubt as to the existence of pneumonia at all, attributing the bronchial respiration to compression of the lung by the effusion which is found in the pleura. But I think that this complicated condition gives rise to graver symptoms than we are in the habit of seeing in either state separately, and, except in those cases where the patient is too ill for physical examination, it can usually be soon determined, but sometimes only by the exploring needle. The mistaking of a pleural effusion for pneumonia is more common than the opposite error.

Some twenty-five of these cases of empyema have occurred in the last three years, and they have usually done well with free drainage. In one case a portion of rib was excised by Dr. Bradford, and the left lower lobe was found to be still solidified after five weeks. The patient had been twice tapped, at first with cloudy fluid, then sero-purulent. The condition was a very critical one, but she made a slow recovery.

Exacerbations in May. With the advent of Spring pneumonias became less frequent, but late in April and early in May wet, cold weather prevailed. Cases began again to multiply, and this exacerbation lasted through the month just passed. At the same time cases of "grippe"

were not infrequent, although few new cases had been seen since February. In order to be sure that my opinion was well founded I consulted our other physicians and found their experience the same.

Dr. Quackenboss, house physician at the City Hospital, also made tables which show the number of cases of pneumonia admitted in May for the last four years, viz.:

May, 1889, . .	21 cases.
May, 1890, . .	20 "
May, 1891, . .	29 "
May, 1892, . .	35 "
	105 cases.

More cases were admitted in May of this year than in any previous month of May, although the number last year showed a considerable increase over non-epidemic years.

Apex Pneumonia. In watching these recent cases I was struck by the number of apex pneumonias. There were five such out of fifteen cases admitted to my service during the month of May, viz.: three in which the disease was limited to the right upper lobe, and two in which the left upper lobe alone was affected. This latter situation is comparatively infrequent, Flint observing it but three times in a series of one hundred and twenty-one cases, or one in forty; the right upper lobe being involved in the proportion of one case in fifteen.[1]

In our series of one hundred and five cases the disease was limited to the left upper lobe in eight cases, or one in thirteen; to the right upper lobe in fourteen cases, or one in seven and a half. In one case, which got well, both upper lobes were solidified. Of these twenty-three cases fifteen recovered and eight died. Four of the fatal cases had delirium tremens, and but one with this complication recovered. The ages varied from three to sixty-five years, neither fatal; there were but three females; and with the exception of a few cases with typhoidal symptoms, no peculiarities in the course of the disease were noticed. Flint says that pneumonia at the apex is more common in some epidemics than in others. It seems to be more frequent also in children, the aged and drunkards.

[1] Henoch found in seventy-four children the right apex involved in twenty-one, the left apex in four only, one in eighteen.

Localization. The other parts of the lungs were involved in the following order of frequency in these one hundred and five cases, viz.: left lower lobe, thirty-one; right lower, twenty-seven; both lower lobes, six; whole left lung, three; whole right lung, three; right middle and lower lobes, three; right upper and middle, two; right middle alone, two; right upper and left lower, one; right lower and middle, and left lower, one.

Thus it will be seen that the right lung was involved in fifty-one cases, the left in forty-two cases, and both lungs in nine cases.

Complications. I will not refer at length to other complications, merely remarking with regard to pericarditis that it was very infrequent. One female with double pneumonia had pericarditis also and died. Several patients with pneumonia of the left side developed the pleuro-pericardial rub, synchronous with the cardiac pulsations. This sound, though external to the pericardium, pleuritic in origin, is often mistaken for the friction of pericarditis.

In one child who developed a lobar pneumonia during an attack of whooping-cough, the characteristic spasms of pertussis entirely ceased until resolution was nearly completed, when they began again, though with less severity. This is the usual rule in such cases.

Sex. Of these one hundred and five cases, occurring in May in four successive years, twenty-seven only, or one fourth, were females.

Seasonal Relations of Pneumonia. Careful meteorological study might show the reason for this May exacerbations. Pneumonia with us is a disease of the cold, wet months, one fourth only of the cases occurring in the five months beginning with June 1st. In May the number usually diminishes, the great majority of cases being between December and April inclusive.

Dr. Edwin Farnham's valuable paper on "*Season and Disease-Prevalence in Cambridge, 1880–1889*," published in the Boston Medical and Surgical Journal, May 5, 1892, shows, from nine hundred and eighty-two fatal cases of pneumonia, that the maximum month was April; while for bronchitis it was January.

This close association of acute lung diseases with cold and wet weather has been the subject for much interesting

study. The elaborate reports of the State Board of Health of Michigan, through its Secretary, Dr. Baker, are well known. More recently Dr. A. Magelssen of Christiania, Norway, has written a comprehensive and valuable work "Uber die Abhängigkeit der Krankheiten von der Witterung,"[1] which met with warm commendation at the last International Medical Congress in Berlin. It goes to show that not only lung affections, but some of the more infectious diseases as well, require the coincidence of cold, wet weather for their extensive development. How this and other depressing agencies, both mental and physical, may render the system more receptive to the specific germs we do not know, but doubtless the epidemiology of the future will discover why pneumonia and typhoid fever with their infesting bacilli have their own special seasons; why, in marked contrast to most other infectious diseases, they attack the male so much oftener than the female; and why pneumonia predisposes to, rather than protects against, subsequent attacks. These are still problems. Exposure may account for the seasonal relations of pneumonia and the preponderance of males.

Many years ago Flint made the statement, which is also made by Loomis, that lobar pneumonia is more prevalent and more fatal in our Southern than in our Northern States. I do not think that this statement is borne out by the mortality returns from the cities, especially Charleston and New Orleans. It is well known that the negro succumbs easily to pulmonary affections, and plantation hygiene is of the worst. But the mortality under these circumstances would be more a matter of race-susceptibility and local sanitation than of latitude.

Dr. George B. Shattuck, of Boston:—I am glad to have heard the papers of Drs. Jackson and Fay. It was a great pleasure to listen to the prudent and scientific attitude which Dr. Jackson took towards the present position of bacteriology in regard to this question of influenza, and the way in which he resisted all attempts to suppose, or to take it for granted that we know a good deal more than we do know. It was only yesterday that I was reading a paper

[1] Leipzig, 1890.

upon the same subject, the author of which had no other material to go upon except that which Dr. Jackson has given us. He evidently had taken everything he had on the subject from Pfeiffer and Canon; from that he had elaborated the whole paper, in which he states that we have at last, what we had the right to expect for a long time back, a positive knowledge of the actual specific poison of influenza, a knowledge, at least, as well based as most things in medicine; and he goes on from this to draw certain conclusions. Dr. Jackson has, it seems to me, stated the present position of bacteriology in regard to this question very cautiously, and has given it to us in a very proper light. The fact that Pfeiffer tells us that he has made experiments satisfactory to himself is no reason that they should be satisfactory to us, and we must await their publication. Of course, the question of finding the specific poison has a great deal to do with the most interesting points connected with influenza and with the very questions which we are discussing here to-day, that is, with reference to the spread of influenza. Dr. Jackson said, and I heartily agree with him, that the strongest indication which we have at present of their being a specific poison for influenza, is not the mode of its dissemination, but its clinical features. It presents such a picture to our observation that we inevitably conclude there must be a specific poison, and by analogy that there is a specific germ, no matter what relation that germ may have to the effects of the poison. But we do not yet know this, we only infer it. The mode of the dissemination of influenza rather counterbalances the impression which the clinical observations make on our minds. If there is this specific poison, if it is spread from one individual to another, it is very difficult for us to explain many of the facts which have been recorded; it is difficult for us to explain the direction of spread in many epidemics. For instance, with the means of travel in modern times the nearest places are not necessarily those which are contiguous, but the great centres of population between which the greatest number of people go to and fro, and between which the modes of communication are the most frequent, easy and rapid. Bearing this in mind, many records which we have with reference to the spread of influenza certainly are contrary to all those observations which

we have with reference to the spread of other infectious diseases.

Then the question of a specific poison has a direct bearing upon the relation of pneumonia to influenza, which was the subject of Dr. Fay's excellent paper. In treating this question myself last winter, I was led to conclude that the relation of croupous pneumonia to influenza was not a direct one. I do not now speak of the cases of catarrhal congestion. It seems to me it is rather a sequel than a complication. Of course these words can be given different shades of meaning. I think my conclusions were the same as Dr. Fay's and Dr. Jackson's. I mean that the dependence of pneumonia upon influenza is indirect rather than direct, that is, it is not the direct result of the influenza poison, but is due to the condition in which the influenza places the individual; and the pneumococcus of pneumonia, which is said to be frequently found in the healthy individual, has here a good opportunity for its development. If that statement is accepted in general, certainly we have the conditions suitable after a severe attack of influenza. And if we agree that pneumonia sometimes arises from exposure to cold as an exciting cause, following or producing a depression of the vital forces, that depression and exposure only too frequently occur during convalescence from influenza, as all practitioners know, and I think this is largely the cause of increased mortality from pneumonia during periods of epidemic influenza.

The gross appearances as well as bacteriological examinations at autopsies made in cases who die from pneumonia following influenza, show no differences from those cases that die of pneumonia during non-influenza periods. Of course, most of our statistics and most of our material for drawing conclusions in regard to such questions as these must necessarily be derived from the results of hospital records and from the reports made to the municipal and state boards. The other material we do not have access to. There are objections to such returns to work from. The objections to the hospital records, as referred to by Dr. Mason, I think I should perhaps emphasize a little more, if we are to consider that the hospital records represent the ordinary returns of general practice. The trouble about hospital records is that such a large proportion of the

patients are in a broken-down condition, either from age, excesses, or misfortune, and so great a number are alcoholic.

In regard to the returns to the municipal state boards, of course the draw-back is the question of diagnosis. There must be a great many doubtful returns made from the point of view of diagnosis, and if we want data from which to draw really correct conclusions, we ought to select the medical men to make the returns, and confine the returns to a certain class of the population.

The statements made lately by Dr. McCollom as to the absence of pneumonia among the inmates of the Suffolk County Jail who were attacked by influenza during the two recent epidemics, are of interest and value in this connection.

ARTICLE XXX.

THE NERVOUS AND MENTAL SEQUELÆ OF INFLUENZA.

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OF BOSTON.

READ JUNE 7, 1892.

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THE NERVOUS AND MENTAL SEQUELÆ OF INFLUENZA.

One of the striking features of the recent epidemic of influenza was the predominance of symptoms referable to the nervous system. This predominance, to be sure, was no new thing. In the epidemic of 1580 in Germany some of the victims became violently insane and wandered over the hills in their delirium (Schweich[66]), and nervous symptoms have been prominent in every epidemic since. Comparative statistics are lacking to show whether the recent epidemic has been more prolific in nervous disorders than the epidemics of the past; but, in view of the greater vulnerability of the nervous system at the present day, as shown by many statistics, such an event is not improbable. Clouston[13] found neuro-muscular symptoms in ninety-seven per cent. of his cases. Taking the single symptom of headache, Stintzing and Weitemeyer[70] found that it was present in 335 patients out of 405, and Schultz[65] noted it in seventy-five per cent. of his patients. Such figures give some color to the hypothesis of Schmitz[63], who claims that influenza is primarily a disease of the nervous system, and that the respiratory and circulatory symptoms are secondary.

It is not my purpose, however, to discuss the theories as to the nature of influenza, and I shall touch but briefly upon the nervous symptoms which may accompany the attack. Most of you have seen more of those than I, and my observations have had to do chiefly with the sequelæ of the disorder.

I hardly need to cite the common nervous symptoms of influenza itself; the profound exhaustion, the aching and

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pain in the head, the back, or the limbs, the extreme mental depression, the persistent insomnia, and many minor symptoms. In the severe cases we may find all these exaggerated, and in addition vertigo, delirium, a typhoidal condition, subsultus tendinum, convulsions, somnolence and coma,—the last, under the name of nona, giving rise to many alarming statements in the daily press. These last symptoms are fortunately rather rare, and are due, probably, to serious brain complications which will be touched upon later.

Influenza seems capable of exciting most forms of disease of the nervous system. I shall therefore consider the various classes of diseases in order, the diseases of the peripheral nerves, of the cord, of the brain, the neuroses, and the different forms of insanity.

Affections of the peripheral nerves are not uncommon. Mills[48] thinks that no single affection has been so common as neuritis,—a statement, however, which I am disposed to question,—and all forms of neuritis have been reported. Most commonly, apparently, the disturbance of the nerves takes the form of a severe and persistent neuralgia. Krehl[39] found neuralgia in about four per cent. of the cases, a percentage which Bidon[7] thinks too small. The neuralgia is apparently most frequently observed in the trigeminal, the intercostals, and the sciatic, but other nerves may be affected. In some cases herpes zoster has occurred. In addition to neuralgia cases of distinct neuritis have been reported. One case of mild neuritis of the ulnar nerve, which I saw, came on two weeks after an attack of influenza. Here the motor symptoms were most marked, and the neuritis was not severe enough to cause anæsthesia. Oculo-motor paralysis, especially paralysis of accommodation, has been reported by a number of observers,—Fukula[25], Uhthoff[72], Bergmeister[6], Pflüger[54] and Goldflam[27]. The latter believed his case to be due to a polioencephalitis rather than to a neuritis. Curiously enough I had under my care at the outbreak of

the epidemic a lady with rheumatic paralysis of the external rectus, who, during recovery, came down with influenza, without increasing the eye trouble. Pflüger[54], Bergmeister[6], Schöler[64] and Stöwer[71] have reported cases of optic neuritis or post-neuritic atrophy. A case of atrophy has come under my own observation, but as it was associated with other symptoms I shall speak of it later. Neuritis of almost any nerve may, in fact, be due to influenza.

A few cases of multiple neuritis have been reported (Homèn[32], Brosset[10], Bruns[11], Lojacono[46], Mills[48]). Considering the frequency of influenza it is apparently much less common than is multiple neuritis after other acute infectious diseases, notably diphtheria. Several post-diphtheritic cases have come under my observation during my term of service at the City Hospital this spring, but I have not seen a single case of pronounced multiple neuritis from influenza in that time. I have seen two or three cases, however, where a slight tenderness of the nerve-trunks and a persistent tingling in the extremities without any paresis have led me to believe that there was a slight disturbance in the peripheral nerves. A woman, whom I had seen in several attacks of exacerbations of multiple alcoholic neuritis, had another outbreak after the influenza. She did not, however, come under my observation in this attack, but it is fair to suppose that the old cause, alcohol, had something to do with it, as she undoubtedly continued to indulge.

Affections of the spinal cord as a result of influenza are rare. Among the more frequent is myelitis of the anterior horns, which occasionally develops after the acute infectious diseases (Eisenlohr,[19] Drasche[17]). I have already cited Goldflam's kindred case of polioencephalitis. Determann[16] cites two cases of undoubted spinal disease without autopsy, in one of which he thinks that there was hemorrhage, in the other meningitis. Bidon[7] and Fiessinger[23] report cases with the symptoms of meningitis. Herzog[31] reports two

cases of spastic paraplegia. Feréol[22], Laveran[43], Bennett[6] and Foa[24] all cite cases of probable myelitis, and Mills[48] reports a case where bulbar paralysis developed soon after an attack of influenza. In cases of a gradual onset, however, it is a question whether disease may not have existed before. In a hospital patient, for example, there was an obscure history of disturbances of micturition and of sensation in the feet; after influenza this increased to actual paresis of the legs. Priester[37] and Kaumheimer[34] report cases of somnolence, nona, which they believe due to changes in the central gray matter of the medulla and pons. Müller[51] attributes a similar case to meningitis.

I have already spoken of some of the more severe cerebral symptoms which may attend the attack of influenza. Helweg[30] and D'Abundo[16] have found very pronounced congestion of the brain at the autopsy of several patients dying of influenza. This congestion may explain such symptoms, although we know too little of the symptomatology of cerebral congestion to speak definitely. Cerebral or cerebro-spinal meningitis has been noted by a few observers, Ayer[1], Leyden,[45] Ewald[21], Bäumler[3] and others, but the affection is less common than many imagine. Bristowe[9] reports several cases of probable abscess, one of which was confirmed by autopsy. With congestion it is not improbable that a diseased blood-vessel may rupture, giving rise to an ordinary attack of apoplexy, as in cases reported by Mills[48], and Prentiss.[56] Eichhorst[18] has noted aphasia, the cause of which is uncertain. Erlenmeyer[20] reports a case of Jacksonian epilepsy, which he thinks due to capillary hemorrhage. A possible similar case has come under my observation, which, from its unusual character, I will briefly report.

A Polish Jew, thirty-four years of age, without any previous taint, was seized, after an attack of influenza which lasted two months, with a curious feeling in the right foot, as of a cramp. This soon passed off, but he had for two

years similar attacks, with greater frequency and greater severity. A week before I saw him he fell unconscious in a fit. Since then he has been very nervous, emotional and apprehensive. In the attacks, as I saw them, he groans, complains much of his foot, but it is not rigid and there is no spasm in it. Nothing could be found abnormal during his attack, and physical examination was negative. The attacks, however, have diminished in frequency and severity under bromide.

Cases of general degenerative disease of the central nervous system are rare, and we can seldom be safe in ascribing them to influenza. I have seen one case, referred to me by Dr. Wadsworth, in which influenza was the only cause that could be ascertained. A man of thirty, with no history of trauma, syphilis, or excess in alcohol, but who had suffered from headache, had influenza two years ago. Since that time he has noted that his general strength has failed, that he has lost twenty pounds, and that his vision is growing very poor. His headaches are much fewer. He had much vertigo and tinnitus, and his hearing had failed. He was nervous and irritable. His bowels were obstinately constipated, and his digestion was poor. He had a constant desire to micturate, but it is hard to start the stream, and his control is poor. The sexual power is much diminished. He has a tired feeling, his legs feel prickly, the right hip aches, and he feels often as if some one had hit him sharply back of the knees. Examination revealed optic atrophy, slight nystagmus on lateral movements, some uncertainty in using his hands, a rapid pulse (110), and a diminution of the skin reflexes on the right side. The knee-jerks were normal. Motion and sensation were not impaired. The pupils were equal and reacted normally.

In a few instances, too, vaso-motor and trophic disturbances have developed. Blake[8] has spoken of certain rather well-marked vaso-motor disturbances in the ear. Krause[38]

and Bidon[7] report cases of swelling due, as they think, to vaso-motor disturbances, and cases of zoster and acute bed-sores have also been attributed to the epidemic. Mills[45] found a myxœdemoid condition in one patient. Lojacono[46] reports a case of exophthalmic goitre. Various circulatory and respiratory troubles, angina pectoris, palpitation, etc., have been attributed to nervous derangements.

It is, however, with the neuroses that influenza has the greatest influence. Bidon,[7] Van Deventer[73] and Grasset[28] report various cases of hysteria following influenza, but, although I have seen patients who were emotionally unstable, hysterical in common parlance, I have not seen grand hysteria following influenza. This is to be expected considering the rarity of grand hysteria in this country. In three cases of chorea there had been a previous attack of influenza, but the causal influence of the disease seems doubtful. Villard[74] and Eichhorst,[18] however, report cases where chorea followed close upon the epidemic disease. Van Deventer[73] and Landgraf[42] report cases of epilepsy. Here we must, as in so many other cases, be very sceptical, for we can seldom exclude the possibility of previous petit mal or nocturnal attacks.

The chief effect of influenza upon the nervous system is the production of that condition which we term neurasthenia. Under this heading may be grouped a vast number of symptoms of various sorts due to unknown conditions of the nervous system. Many of them, it is true, may be referred to exhaustion or asthenia. Many of us have had personal experience of that condition of prostration after influenza when the grasshopper became a burden. In many cases, after a little, the victim has been able to attend to the routine of daily work, but it was done with increased effort, new undertakings appeared formidable, and any pretext to shirk them was readily seized. Slight mental or physical effort produced unusual fatigue. In more marked

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instances there was a condition of hypochondria, and slight disturbances produced apprehension of some impending disease; mental irritability and depression have been common. Headache, insomnia, and nervous dyspepsia have been prevalent. The capacity for mental and physical labor has been diminished, or if it could still be done it was followed, as I have said, by profound and unusual exhaustion. In my own experience, for example, I found that, three months after a very slight attack of influenza, although I could still work as rapidly and apparently as easily if the pressure were great enough, if the work were kept up until one or two o'clock in the morning sleep was disturbed.

It it hardly necessary to cite the various writers who have noted the neurasthenic conditions. A case or two from my own observations will suffice to show the common condition.

An old man worked for a week through a mild attack of influenza. After it he became very nervous, he had pain in the side and palpitation, his appetite and digestion failed, he had vertigo, he felt weak and miserable, and complained of persistent insomnia. Physical examination was negative. He slept some under sulfonal, but convalescence was slow.

A young married woman, naturally nervous, whom I saw last February, had influenza two years ago. Ever since then she has been weak and more nervous. She has some headache and a little indigestion, and complains much of soreness and pain in the chest and back, and darting pains in the arms and legs. There were various hyperalgesic spots on the trunk. She had a good appetite and slept well. There were no disturbances of motion or sensation, the reflexes and pupils were normal, and an examination of the chest revealed nothing but a rapid action of the heart. She improved quite rapidly under treatment.

A lawyer, aged fifty, had begun to get nervous under very hard work. Then he had influenza, and after it had some very important and difficult work on his hands, work-

ing late at night. After a fortnight he had swimming in the head, vertigo, and a "paralyzed" feeling in the legs and arms, and he staggered a trifle on walking. At times he had a numb feeling in one foot or one hand. He had a little headache, and slept worse than usual. After a month's rest at the seashore, and five months after his attack of influenza, he went to pieces nervously; he had intense nervous paroxysms in which he walked the floor, "feeling as if he should fly." His appetite and digestion failed. His bowels were very costive. His tongue at times felt thick and he had more or less swimming in the head. His will power was diminished, but he had no confusion of ideas or mental impairment. He was depressed and wretched. Examination of the chest, the urine, the eyes, the reflexes, sensibility and mobility revealed nothing of importance. He made a good and speedy recovery.

If we were to judge by the reported cases, mental disease is probably more frequent than nervous disease as a sequela of influenza, but I think this is to be explained rather by the fact that more interest has been taken in the mental sequelæ, and that more of the cases have been reported. Through the kindness of Drs. Elliot, Dewey and Noyes, I have been able to collect statistics from the Danvers, South Boston and McLean hospitals, which may supplement those of Dr. Harrington,[29] which he reported to this Society two years ago.

To Dr. Harrington's twelve cases at Danvers Dr. Elliot adds ten, two mania, two melancholia and six confusional insanity. Out of one hundred and seventy-five admissions at the McLean, five were possibly due to influenza, three melancholia, one delusional insanity, and one mania. Here influenza was only one of various ætiological factors. Of eight cases at South Boston two were mania, two melancholia, one epileptic insanity, one senile insanity, and two post-apoplectic insanity. Out of three hundred cases that I have

collected, including the above and my own personal cases, I find ninety-three set down as melancholia, sixty as mania, forty-four as acute confusional insanity, twenty-nine as acute delirium, fifteen as delirium tremens, where influenza proved the exciting cause, nine as dementia, eight general paralysis, six febrile delirium, seven paranoia, and five hypochondriasis, the rest being divided among the other forms of insanity. The figures for acute confusional insanity are doubtless too small, as it is often mistaken for other troubles. Clouston notes particularly an increased percentage of melancholia as compared with mania since the epidemic began. Excluding the cases of acute delirium, which may be referred to conditions of profound congestion, the majority of the other forms of insanity may be regarded as of asthenic types.

In regard to the more chronic forms of insanity or to organic affections, like general paralysis, I feel sceptical, although a few are reported. I am more inclined to believe, with Mills,[48] that the influenza has stirred up some old syphilitic process or exaggerated some previously unnoticed defect, although Krypiakiewicz[40] reports one case where the ætiology seems fairly clear.

In an obscure case of my own, influenza was only one cause. The patient was a man of thirty-five, who lost his situation as a painter four years before. This made a profound impression on him, but influenza made matters much worse. There was for a time nocturnal enuresis, memory failed, he became depressed and irritable, dwelt on the inconsistencies of life, was nervous and hypochondriacal, but withal he did not seem to realize his financial situation or to be anxious about it. For six months the speech had been hesitating and nasal, but the hand-writing was unimpaired. The pupils were unequal and failed to react to light. Otherwise the physical examination was negative.

The action of influenza upon those already insane is,

curiously enough, not very marked. The insane seem, for some reason, to be less susceptible to the epidemic. At South Boston, Danvers and Somerville a larger percentage of the attendants than of the patients were attacked. Cantarano[12] found 7.28% of the insane patients, and 62.9% of the infirmary patients at Palermo were attacked. At Sales 9.28% of the insane and 31.48% of the infirmary cases suffered. Sander[61] considered that at Dalldorf the insane had a more benign form of influenza. Perhaps the greater exposure and harder work of the attendants have something to do with these figures.

In some cases insanity is little influenced by influenza. In other cases it is made worse. Snell[68] found at Hildesheim that in two cases out of eighty-two the insanity grew worse. Robertson and Elkins[59] found that the influenza increased the mental symptoms. Mispelbaum[49] found similar conditions. Cantarano[12] found little change, although at times the patients were exalted by it. Helweg[30] thinks that in the stable forms of insanity influenza has little influence, but in progressing cases it may cause an outburst of symptoms. In cases where the brain has very little activity, as in tumours or advanced general paralysis, influenza may bring the little activity to a standstill. Influenza may also change the type of the insanity; thus Morselli[50] noted the first apoplectic seizure in a general paralytic after an attack of influenza, and that the phases of folie circulaire were suddenly changed by it. Bartels[9] states that a quiet paranoiac became confused, excited, refused food and finally died. In a few, rather questionable cases, it seems to have worked beneficially. Dr. Elliot writes me that a patient at Danvers had general paralysis, alleged to be due to influenza; while in the hospital he had another severe attack of influenza which has caused a very pronounced remission, so that he is considered well. Roller[40] and Metz[47] report alleged cures of paranoia.

There is another action of influenza of which I have thus far spoken indirectly. Enough has been said to show that its action is that of a depressant. It lowers the entire plane of the individual, mental, moral and physical, and in this way he becomes more vulnerable to other injurious influences. Thus there have been several patients in the City Hospital with syphilis, but in a latent state; after the influenza the syphilitic symptoms began to manifest themselves, but yielded to the appropriate treatment. I have already stated that insanity may be rendered worse by it. All observers agree, however, that the essential factor in all these cases of insanity alleged to be due to influenza is predisposition. Dr. Cowles states that influenza is but one factor in the production of insanity in the cases at the McLean, and in my own cases heredity, trouble, and excess had an important share in the ætiology. In lowering the plane, influenza has given other factors a chance to work, or has lessened the patient's resistance to morbid conditions already existing. I could cite several cases of neurasthenia where the progress to recovery has been materially checked, and one case of traumatic hystero-neurasthenia which has been reduced from a condition of tolerable comfort to a state of invalidism. In other cases, as in insanity, influenza has seemed to have little effect on the original trouble.

We see from what has been said that there is no special form of nervous or mental disease which is the specific product of influenza, nothing even which bears the close relation to it that pharyngeal paralysis does to diphtheria or tabes to syphilis. The chief nervous sequelæ are peripheral nerve troubles,—neuritis or neuralgia,—and depressive asthenic conditions, which may be classed under the vague general heading of neurasthenia. The mental states are most commonly exhaustive states, represented by acute confusional insanity (acute Verwirrtheit), which Krypiakiewicz[40] thinks is commoner in young persons, depressive states, melancholia,

which is commoner in those of more adult years, and mania. With profound febrile conditions and intense congestion we may have acute delirium. Pronounced mental disturbance demands, as I have said, some individual predisposition. If the individual be previously sound the nervous sequelæ are usually slight and the prognosis is favorable. Where other factors come into play of course their influence must be considered.

These conditions, however, are by no means specific. They occur after any of the acute infectous diseases. Neuritis, as is well known, may follow typhoid, pneumonia or diphtheria; neurasthenic conditions, of a much more severe and protracted type, are common after typhoid and other diseases; and the various psychoses may also occur. Cantarano[12], indeed, believes that the percentage of insanity due to influenza is smaller than that due to the other acute diseases.

Much has been said, especially in common talk and the patent medicine advertisements, to lead us to believe that nervous affections have been unusually prevalent as a result of the epidemic. Clouston[13] states, that the nervous tone of Europe has been lowered by it. "The influenza epidemic," says Mills[48], "has impaired the *morale* of the community. Lack of spirit in work, and an apprehensiveness with reference to health, business, and all matters of personal interest have been abnormally prevalent. The hysterical have become more hysteric; the neurasthenical more neurasthenic. Hypochondria has displaced hopefulness in individuals commonly possessed of courage and fortitude. In brief, certain neuropathic and psychopathic features have been temporarily impressed upon the community." With these opinions I would agree. Influenza has undoubtedly been followed by a general weakening of the entire system, but the percentage of true nervous troubles due to it is, I believe, very small. I have seen in the past three years, for instance, more cases of post-diphtheritic

neuritis than I have of neuritis following influenza. In my service at the City Hospital, embracing each year the months from February to May inclusive, just after the violence of the epidemic was over, I have found that the epidemic had after all but little influence on the number of cases or the character of the nervous troubles. In only a few cases of the many seen during the service did it exert any marked influence. When we consider that, according to Shattuck's[67] estimate, forty per cent. of the adult population was seriously affected during the first year of the epidemic, such a statement has some bearing on the question. The only statistics which have come in my way are those of the German army[26]; here nervous sequelæ, chiefly in the form of neuralgia, were noted in only 0.53 per cent. of the cases.

Of course, if we take into account all the nervous disturbances of the attack itself, the pains, headache, etc., Kirn's[36] statement that in no other acute infectious disease do we meet with so many nervous disorders, may be regarded as approximately true, but if we consider merely the nervous and mental sequelæ we must admit that, as influenza is one of the milder acute infectious diseases, so its sequelæ are less frequent and less severe than those of the other affections. It has taken heavy toll from the aged, the degenerate, the neuropathic and the alcoholic, but its effects on the healthy, considering its prevalence, have been mild.

A final word as to the causes of the nervous disturbances. Kirn[36], Nägy[53] and Ladame[41] lay some stress upon the fever of influenza. This, however, is usually slight, and in many cases seems inadequate, for the symptoms often do not develope until several days or even a week or two after the fever has subsided. It is undoubtedly a factor in causing the delirium of the attack, and perhaps in producing the subsequent congestive conditions. The most probable cause of the symptoms in the majority of cases seems to me to be the poisonous effect of some ptomaïne formed by the bacterium of the disease.

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DISCUSSION.

Dr. J. J. Putnam, of Boston:—There seems to be an abundance of clinical evidence that the nervous affections of influenza are due in part to the action of a specific poison, and in part are only indirectly connected with the main disease, occurring either as a result of exhaustion, or as secondary to the local processes to which the influenza itself gives rise. In general, it may be said that these affections are of two kinds: first, those unattended by gross imflammatory or nutritive changes; second, those in which such changes have occurred. It is only of the latter class that I intend to speak, but before doing so, I wish to say a word about the frequency with which nervous symptoms have followed the influenza, without regard to their character. I have been in a good position to judge in regard to this point, because I have had a continuous service for many years in the Out-patient department of the Massachusetts General Hospital, where more than one thousand patients with nervous diseases of all sorts present themselves in the course of the year. Besides this, through the courtesy of the attending physicians I have opportunity of examining patients in the wards. In this way I might be expected to have seen a good assortment of the nervous sequelæ of influenza, except those not severe enough to call for special treatment. Instead of being sur-

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prised at the frequency of these sequelæ, I have been struck with their infrequency. After the first epidemic we noticed but very few well marked cases. This year they have been more common, and some of them of great interest, but still only a handful in gross number. I have also been over the books of the out-patient department for the past four years to see whether the various forms of nervous diseases not classified as "post-grippel" had been more frequent during these two epidemics than in other years. There has, however, been no notable increase, except that the choreas were more than twice as numerous between November, 1891, and May, 1892, as for many years past, not excepting the year of the first epidemic. It is, however, quite possible that this increase is not directly due to the influenza, because no such general increase has been noticed by other observers. One case of ordinary epilepsy in a young girl had its origin during or immediately after a well marked attack of the grippe, but there were no signs of localized cerebral disease [hemorrhage or encephalitis] such as characterized the cases of so-called Jacksonian epilepsy, which have been reported by other observers.

The principle characteristic, if one may call it such, of the nervous sequelæ of influenza in general seems to consist in their great diversity, but it would seem more probable that this indicates that the disease picks out weak spots than that it is specifically related to any special functions or parts of the nervous system. The diseases that I wish to refer to now are, as I said above, those which have been attended by gross nutritive changes, viz.: multiple neuritis, meningitis, encephalitis, and myelitis.

I will speak first of neuritis. It is a remarkable fact that the peripheral nerves are extremely prone to suffer under the influence of a great variety of poisons circulating in the blood or injected into the tissues; and it is not remarkable that nearly all the different forms of neutritis, both the multiple and the localized, have been observed also after influenza. They are, however, by no means common. During the first epidemic I was able to note but one or two cases, and there was some doubt as to their true cause, and further doubt as to whether there may not have been a double cause, since arsenic was found in both patients' urine. Not more than one or two dozen of well marked cases have

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been reported by other observers. During the recent epidemic I saw, in consultation with Dr. Clark of Melrose, one case which was extremely interesting, both because the history was clear and because the neuritis was of the rather rare, so-called ataxic type. The patient was a young man in good health and of good antecedents. In his case also a trace of arsenic was found in the urine, but it is so common to find traces of arsenic in the urine of persons in health that too much importance should not be attached to this fact. The case was a moderately severe one, and the patient is not yet by any means entirely well, though four months have elapsed. My colleague Dr. Baldwin has also seen a typical case of multiple neuritis in an elderly patient with influenza. It is also worthy of note that several well marked cases of multiple neuritis have presented themselves during the epidemic for which no special cause could be discovered. A child who has had a severe and typical attack, involving the muscles of the face and eyes as well as those of the extremities, is at this moment convalescing at the New England Hospital, and the question arises whether the poison of the influenza could have caused these outbreaks without having given rise to the usual catarrhal symptoms, or any other acute symptoms beyond those of the neuritis itself.

It is a well recognized fact that the causes which give rise to multiple neuritis are also liable to induce neuritis of single nerves, and a number of observers have thought that they could trace optic neuritis, not to speak of neuritis of the extremities and the face associated with neuralgia, to influenza.

An especially interesting question is whether the serious cardiac symptoms so frequently noted, and also the anomalous forms of pulmonary diseases, could have been due in part to neuritis of the vagus. This matter is quite ably discussed by Bidon in the Rev. de méd. for 1890. The only contribution that I have to make to this part of the subject is to note that in a case of multiple neuritis which I saw in consultation with Dr. Morris, of Charlestown, some years ago, and which followed immediately after exposure to wet and cold, the lungs were found filled with nodular hemorrhages, and collections of leucocytes were discovered around the vessels in the medulla and in some of the roots of the vagus nerve. Dr. Brown-Séquard long ago showed that such hemorrhages may follow puncture of the medulla.

One of the most interesting results of the influenza has been the encephalitis, which is considered by Fürbringer to be due as a rule to multiple hemorrhages, the result of changes in the vessels and in the blood. Fürbringer has collected ten cases, about which I will not take your time to speak at length. He admits the possibility, which of course is always present, that the real cause was not discovered, and that the connection with influenza may have been one of coincidence.

I have seen three cases which deserve to be described in this connection. The first is that of a lady, under the care of Dr. E. S. Boland, of South Boston, through whose courtesy, together with that of Dr. Cutter, of Charlestown, I am indebted for the history, and for the privilege of having been present at the autopsy and having had the opportunity to make microscopical examinations of the brain. The patient was a maiden lady, seventy-one years old. During the convalescence from a well marked attack of influenza, from which she had recovered so as to be up and dressed, she was suddenly attacked, first with a temporary unconsciousness, and then, three days later, with twitching of the left side of the face without loss of consciousness. These attacks of twitching recurred at short intervals and gradually involved the arm, and finally resulted in hemiplegia, and death on the second day. At the post-mortem examination the only change noted in the brain was that the tissues were soft and pale and that there were signs of excessive vascular dilatation and also spots of yellowish discoloration in the capsule. On careful microscopical examinations there were found signs of œdema, and besides this an excessive amount of blood pigment in the vessels and the tissues for some distance around them, and also a diffuse infiltration with leucocytes in the neighborhood of the vessels and numerous corpora amylacia in the same localities. There certainly seemed to be more than œdema present, and the question is whether vascular encephalitis was not beginning. The appearances certainly suggested those described by Fürbringer and by Strümpell.

The next case is that of a man, aged forty, also of good previous health, seen by me in consultation with Dr. Kemble, of Salem. He had had a well marked attack of influenza during the height of the epidemic, and had appa-

rently recovered. About six weeks later, without obvious cause, he had first a severe attack of sneezing, with a temporary loss of sight and hearing. This was immediately followed by an intense headache, which confined him to bed for two weeks. Then a left hemiplegia came on, lasting one week, associated with disorder of vision. When I saw him the hemiplegia had nearly disappeared, but a well marked double optic neuritis was recognizable on two visits. He continued to improve, and is now nearly well, though the vision of the left eye is still imperfect.

The third case is one of suppurative meningitis, causing first localized convulsions of the left side without loss of consciousness, occurring at short intervals during several days, and terminating finally in death. The convulsions had been preceded by a week of severe headache, and by an even longer period, covering perhaps two weeks, during which the patient came home at night feeling chilly and with diffuse aching, but recovered with rest sufficiently to return to his work the next day. This condition was at the time considered to be influenza. The only other cause to which the purulent meningitis could be assigned was a severe injury to the head causing a penetrating wound which occurred eight years ago, but from which the patient had apparently entirely recovered.

Where inflammation is not made evident by positive signs, one should not be too ready to assume its presence. A number of cases have been reported suggesting meningitis by certain symptoms, such as spasm or pain, where, however, some symptoms were wanting to make the diagnosis. Such a case I saw in consultation with Dr. Tilton, of Lexington. The symptoms consisting in intense pain and spasms pretty much all over the body; the patient being a strong healthy policeman and the influenza unquestioned. After a long period of great prostration he recovered. I am led all the more to doubt whether meningitis was really present in this case because I had the opportunity to be present only a short time ago through the kindness of Dr. Hodgdon, of Arlington, at the autopsy of a patient, who as the result of typhoid fever had suffered from very similar symptoms, which came on after convalescence was well established. At the autopsy no signs of meningitis or myelitis could be detected.

ARTICLE XXXI.

HYDATIDIFORM MOLES.

By GEORGE A. CRAIGIN, M.D.
OF BOSTON.

READ JUNE 7, 1892.

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ANALYSIS OF TWENTY-FIVE CASES OF HYDATIDIFORM MOLES.

THE object of the following paper is to introduce the subject of hydatidiform moles.

The disease is a rare one; yet few men of large experience escape without a case or two, and the gravity of the trouble, its varying manifestations, the difficult diagnosis, and the necessity for prompt, energetic, yet well-considered treatment, all give it importance.

Without attempting to present a review of the literature on the subject, I have collected twenty-five cases reported recently, and have tabulated them for comparison with the stereotyped clinical picture given us in the text books. The exact figures can have little importance, especially as the reports have been made by so many different men, and with such varying degree of accuracy and detail. Yet in a general way a good deal can be inferred from such a table; and as no individual is likely to have enough cases to enable him to generalize, it is hoped a collection of this kind may be useful.

Pathology. The pathology, while interesting and the subject of much discussion, may be dismissed with a few words, as our object is strictly clinical. According to the generally accepted theory, the hydatidiform mole is always developed from an impregnated ovum. The characteristic is an abnormal development of the chorionic villi, usually at the expense of fœtal tissue. These villi undergo a myxomatous degeneration, there being formed cyst-like enlargements of the villous tubes varying in size from a pin-head to

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a walnut. These, branching from one another, with thread-like connections, resemble bunches of grapes or currants. The cysts are generally translucent, and contain a slimy fluid in which is a certain amount of mucin. The proportion between mole and fœtal tissue varies, but three types are recognized:

(1) Where there is a fœtus contained in an amniotic sac.

(2) Where there is still an amniotic sac with perhaps traces of a cord.

(3) Where there is nothing but the hydatidiform mass.

As the placenta is naturally formed toward the end of the third month, the myxomatous degeneration must necessarily begin during the first three months, since the placental tissue is never the seat of this change. In its formation the decidua takes the usual course, and envelopes the mole. The villi are embedded in the maternal tissue—at times penetrating even to the peritoneal covering. From this there follow some important points: (1) The uterine wall may be greatly weakened. (2) There is chance of tremendous hemorrhage on separation of the mole from the uterus, owing to the intimate relation between villi and uterine sinuses. (3) Parts may be left embedded in the uterine wall with increased danger of hemorrhage and sepsis.

Ætiology. The ætiology is still obscure. The following facts however are suggestive: The mole occurs more frequently—(1) in multiparæ, especially where pregnancies have followed in rapid succession; (2) between the ages of twenty-five and forty; (3) where there has been preceding molar pregnancy; (4) where there is syphilitic or cancerous dyscrasia; (5) where there has been endometritis. The last is especially emphasized by Virchow, and is perhaps often the important factor in the other conditions mentioned. The frequency of occurrence is not well determined, the estimates varying from 1 in 20,375 (Boivin), to 1 in 532. (Charity Hosp., Berlin). The probable average is

about 1 in 3,000. The maternal mortality has been estimated at 13%.

The fœtus at best is feeble. The mole, though generally expelled before the seventh month, may be carried far beyond term or after a living child. Boivin reports one at fourteen months, and there is a report of two at five and six years. The size may reach that of a child's head. In multiple pregnancy there may be a mole and a healthy child.

The usual course of the disease, as laid down in the text books, is something as follows:—Pregnancy is recognized. The uterus increases rapidly in size, out of proportion to the time. There is usually a vaginal discharge of watery or thin bloody fluid about the third month, and after; at times containing the cyst-like bodies. There may be occasional hemorrhages later. The feel of the uterus is doughy except in its lower segment, which is peculiarly tense. A sense of fluctuation is rarely obtained. There is no ballottement. No fœtal heart can be heard. Fœtal parts cannot be felt. Fœtal movements are absent. Abortion occurs before the sixth month as a rule.

As diagnostic points of especial value, are mentioned: (1) Rapid growth of the uterus; (2) absence of signs of fœtus; (3) discharge of bloody water with cysts—the pathognomonic sign,—(4) and tense lower segment.

Absence of reflex symptoms is regarded as important by some. The impression given by the usual description is that the clinical picture is quite well defined, and diagnosis should be fairly easy.

The result of tabulating the twenty-five recent cases was as follows:—I found that the age varied greatly, and was younger than it is generally estimated, being on the average about thirty years. The oldest was fifty-five, the youngest twenty, though in reading I came across one at eighteen years. The number occurring among the earlier pregnancies was also a surprise. Out of the twenty-five there were

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six in their first, three in their second, and three in their third pregnancy. Thus one quarter were primiparæ, and nearly one half as early as the third pregnancy. Eight had had previous abortions. Three had aborted once: three twice (in one case a mole each time); one three times (one a mole), and one four times.

Little else was noted among predisposing causes. Specific history was seldom found. In fourteen it was stated as absent; in six not stated; and in the remaining five doubtful. Cancer was not mentioned, neither was endometritis. This of course has very little significance, meaning simply that the reporter had not inquired into it. The length of time the mole was carried varied from eleven weeks to seven months, with an average in twenty-two cases of four and a half months.

Among the ordinary signs of pregnancy the condition of the breasts was noted in seven cases. Of these three were small or flabby, though one had pigmentation of the areolæ. Four were enlarged; one without, the others with pigmentation. In one or two the enlargement of the papillæ was especially noted. One had milk. The characteristic bluish discoloration of the labia was mentioned in one case. Nausea and vomiting was a marked symptom, occurring in ten out of twenty-five. In six of these it was very severe. As a rule it appeared early, sometimes at the very beginning, and became more and more distressing. It was present in each of three cases where the uterus was tender, being in proportion to the amount of tenderness. The uterus had enlarged very rapidly in these three, and in most of the other cases with nausea. Nausea was more frequent in the first and second pregnancy. Salivation occurred in but one. Abdominal pain was a symptom in two; in one coming on in paroxysms from side to side, in the other intermittent and apparently owing to uterine contractions, as it was always accompanied by blood or watery fluid. In two

cases the patients were very positive that they felt life. One was delivered at the end of the fourth month, the other in the middle of the fifth. The size of the uterus was mentioned in fourteen cases. Of these thirteen were larger than normal for the period. One was smaller—a case where abortion was induced at the fourth month for uræmic convulsions.

A deceptive feeling of ballottement and an indistinct sense of fluctuation were noted in one case—delivered early in the fourth month, the uterus reaching to the umbilicus. The doughy, boggy feeling was mentioned only once. There was no œdema in this case. A distinct bruit was mentioned in one, like the placental sound. Œdema was mentioned in six out of the twenty-five. It was generally of the ankles, legs, genitals and abdomen, but was found once in the hands. In only two cases of œdema was albuminuria noticed. One of these died from hemorrhage and uræmia—the duration of pregnancy not known. The other had uræmic convulsions, but was delivered rapidly in the fourth month and lived. Uræmia and albuminuria were not mentioned in the other twenty-three cases.

In six cases there was no vaginal discharge prior to the hemorrhage at the time of delivery. The average duration of these cases was four and a half months. In all but one of them the abortion began with a severe hemorrhage without any warning. The one exception was delivered spontaneously at four months and ten days, with the decidua intact, enveloping the mole. In but one of the twenty-five cases was there at any time a watery discharge. This was "like amniotic fluid," but alternated with blood. It appeared at the third month. A fœtus 30 c.m. long was expelled with this mole at five months. Watery blood was noted in four only. In one it appeared at the sixth week, and was slight but constant the remaining six weeks. In one it was constant from the beginning, but slight and lasted

four months, when the patient was delivered for eclampsia. In two there was a slight, intermittent flow for about six weeks.

In fifteen cases the flow was apparently not enough unlike an ordinary discharge of blood to be noticed as such. Six of these had a *constant* flow beginning between the third and sixth month, and lasting from three to eleven weeks. In two the amount lost was large enough to seriously affect the general health.

In five the flow was intermittent, appearing between the first and sixth months, and lasting from two weeks to five months. In one the amount lost was considerable.

In three the flow was intermittent to begin with, but became constant, and considerable in amount. It began between the fifth and eighth week, and lasted one to three months. The time when the discharge appeared was noted in sixteen. It ranged between the fourth and twenty-fourth weeks, the majority (nine) being between the sixth and twelfth. One flowed apparently from the very beginning.

In not one case were cysts noticed in the discharge. Clots were mentioned in one, and a few shreds in another. In one, on using the speculum a small mass of cysts was found protruding from the os; and in another, after ergot had been given, a few came away.

The notes on the cessation of menstruation were rather meagre, but from what I could learn the flow often stopped entirely as in normal pregnancy, although perhaps a comparatively large number had irregular or imperfect menstruation for a month or so. In one case menstruation went on as usual until a month before delivery, when intermittent and later constant hemorrhage set in. This was in the fatal uræmic case; and she must have been several months pregnant, as the uterine tumor extended two or three fingers' breadths above the umbilicus.

The number in which hemorrhage was profuse, either

just before or during expulsion, was comparatively large—seventeen out of twenty-five. Of these thirteen occurred before any treatment could be given, six being very severe. During treatment and before complete expulsion, four bled profusely; but in every case after the uterus was empty its walls contracted well, and hemorrhage ceased. The condition of the cervix at the time of the last examination (just before treatment was begun) showed that in almost every instance very little change had taken place, even when there had already been profuse hemorrhage. In all the primiparæ the os was tightly closed, the cervix long and often "dense." In the others "slightly patulous," "admitting one finger," rarely "two fingers," or "slightly dilated."

The following incident is instructive: A tampon was put in for slight hemorrhage, the patient a multipara. On removing the tampon eight hours later, the os admitted a finger tip. The doctor went away, and returning seven hours later found the patient nearly moribund from an enormous hemorrhage. The os was but 2 c.m. in diameter.

A small placenta was mentioned in three instances; and curiously enough all were of the placenta prævia variety.

One patient began with what appeared an ordinary abortion, and was delivered of a dead three-months fœtus with membranes (nothing said of placenta). Hemorrhage and pains continued, and the next day a large hydatidiform mole was expelled. In another a dead fœtus 30 c.m. long was expelled with the mole. The placenta (a prævia) was small and bloodless. The decidua was intact or nearly so in two, in both of which hemorrhage was slight. They were delivered at three and four and a half months.

The manner of expulsion varied greatly. In four the whole mass was expelled from the uterus without any assistance, and but one was accompanied by hemorrhage of any account. In such it is fair to infer that the villi did not enter deeply into the uterine tissue. All made a good re-

covery, and none were earlier than the fourth month. Three started in spontaneously, but the expulsion was incomplete, and had to be finished by the curette or hand *in utero*. Of these all had considerable hemorrhage. One made a slow recovery, owing to the necessity of irrigation and curetting for ten successive days before all was removed. They ranged between four and five and one half months. Six were dilated by instrument or the hand, and the uterus emptied immediately. Only three of these had much hemorrhage at the time. The only one with slow recovery bled little at the operation, but had lost considerably for a month.

Ten cases were treated first by tampon, ergot, or the two combined; and all but two had to be finished by the curette or hand. In one, Crédé's method of expression was used successfully with an os 2 c.m. in diameter. This patient was the one mentioned as having bled after removal of a tampon. She died later of sepsis. Two of the ten made a slow recovery; one from sepsis due to retained fragments, where the curette was not used, reliance being placed on glycerine plugs, ergot, and douches. This was one of the cases with dead fœtus. The other slow recovery was due to the effect of hemorrhage which was very great, owing to delayed treatment. The patient refused instrumental interference till hemorrhage was alarming.

One patient had a spontaneous delivery after pains had been started by the passage of a sound.

Three died:—one undelivered, probably from hemorrhage and uræmia (no convulsions); one from sepsis on the seventeenth day; one, five months after delivery, from a papillary epithelioma of the uterus, which pathological examination showed to be due in all probability to the retained villi. This patient was the oldest, being fifty-five years.

From a consideration of the preceding summary the following points seem worthy of emphasis:

(1) Primiparæ are not rarely affected; and the average age is younger than generally estimated.

(2) There may be present any of the ordinary changes of breast, labia, etc., found in normal pregnancy.

(3) There is medico-legal importance in the following: *a*. origin from impregnated ovum only; *b*. the placenta once formed is never the seat of this myxomatous change; *c*. the mole may be carried beyond term or after a living child; *d*. the appearances after delivery of a mole may be indistinguishable from those after child-birth.

(4) Reflex symptoms of nausea and vomiting common to pregnancy, so far from being absent or rare, are rather frequent, and as a rule are early, severe, progressive.

(5) There may be œdema without albuminuria. Schul, who has recently made a study of the relation of albuminuria to hydatidiform mole, finds that while it does not occur oftener, it generally appears earlier than in normal pregnancy.

(6) Uræmia may be a complication, and, with convulsions, is amenable to the same treatment as in pregnancy.

(7) Too much stress has been laid on the so-called characteristic discharge of thin watery blood, with occasional cysts. For while in the cases cited the flow may not have been pure blood, it was so nearly that in a large proportion of cases, that no distinction was noted. Therefore, any vaginal discharge, watery or bloody, slight or considerable in amount, intermittent or constant, and without cysts, is perfectly consistent with hydatidiform mole.

(8) Sudden hemorrhage, sufficient to cause grave general symptoms, is frequent; as also exhausting intermittent flow.

Diagnosis.—The diagnosis in a considerable number of cases will not be made because there is nothing but a rather large uterus to make the patient suppose her pregnancy abnormal, until severe hemorrhage sets in. In most cases

the diagnosis in the early months will be almost impossible, although vaginal discharge, enlarged uterus, and possibly reflex symptoms, point to the uterus as the seat of some pathological process. The differential diagnosis will very likely have to rest on the passage of a sound; and unless cysts are brought away even that cannot ensure certainty. Even in those cases where the uterus has reached such a size that one could look for signs of a fœtus, there must often be great uncertainty, particularly as it is possible to have a living child. And when there is no fœtus the placental bruit, the feeling of life by the patient, with the pseudo-ballottement, are all misleading: and more so if there is a small placenta prævia, or an intact decidua with clots, which must give a placental feel. Again the uterus may be smaller than normal for the period. And menstruation may be regular for several months.

On the whole, then, it is evident that while diagnosis may be exceedingly easy, it must often be difficult if not impossible. There is not a sign or symptom ordinarily mentioned as diagnostic that may not be absent, and these cases show, if nothing else, the folly of relying on any one sign or especial group of signs.

Treatment.—When diagnosis cannot be made these cases must be treated on general principles, and it must often happen that nothing is done until hemorrhage, exhausting nausea and vomiting, or convulsions indicate the immediate emptying of the uterus. When once the diagnosis is made the following points have important bearing on the treatment:

(1) The patient is liable to repeated hemorrhages sufficient to cause grave general disturbance, and to sudden severe hemorrhage.

(2) A closed rigid os is almost the rule even after severe hemorrhage.

(3) The mole can be delivered without complete dilata-

tion, and with no more loss of blood than is almost certain to follow later, when it may not be easy to interfere.

(4) The uterus contracts well after being emptied, even when pains have not been present before dilatation was begun.

(5) Uterine stimulants and tampons will generally have to be supplemented by the hand or curette.

(6) Tampons with delay increase the danger of infection.

(7) Incomplete expulsion makes hemorrhage and sepsis liable.

(8) The possibility of a thin uterine wall should be borne in mind when the curette, the hand *in utero*, or Crédé's method of expression are used.

In the light of the above facts the proper course to be followed is clear. The uterus should be emptied as soon as possible. Just how to begin this, however, may be a question. To rely entirely upon tampons, colpeurynter and ergot would be poor practice. The process is slow and imperfect; hemorrhage and exhaustion greater. Yet in cases with rigid os and long dense cervix, undoubtedly the firm vaginal tampon is a most effective means of starting up pains, and getting a soft and dilatable os. It has another advantage, that of controlling hemorrhage to a considerable extent during dilatation. Nevertheless the patient should not be left for any length of time without skilled attendance; for even if there is no leaking by the plug there may be concealed hemorrhage. It is very dangerous to leave after removing the tampon, no matter how small the os.

The use of ergot before the uterus is empty has been recommended by many, but it must be as objectionable here as in the third stage of labor. In any case, as soon as the cervix will permit a rapid dilatation by hand or instrument, this should be done under ether, and the uterus emptied rapidly and completely by the hand or curette. And it should be remembered that complete dilatation, while de-

sirable, is not necessary, for the soft friable nature of the tumor allows its removal with curette alone through a comparatively small canal. The possibility of thinned uterine wall must be kept in mind.

During the operation hemorrhage is generally profuse, but as it almost invariably stops with the complete removal of the mass the only thing to do is to get through as quickly as may be. Of course before starting in, every preparation should be made for this hemorrhage, and such means should be on hand as the operator is accustomed to provide in case of post-partum hemorrhage. The uterus once empty behaves like that after child-birth, and the principles of treatment are the same. An antiseptic uterine douche must always be given if instruments or the hand have entered the cavity.

The mortality in this series is fairly low (three in twenty-five), especially when it is considered that one patient was almost beyond all help before being seen; another died five months later of secondary cancer, leaving one to be accounted for by septicæmia. It would seem, then, that with treatment early and prompt enough to prevent long-continued hemorrhage, and with careful antisepsis, the prognosis should be better to-day than it was when most of the statistics were made out.

Dr. S. H. Ayer, not being able to be present, has kindly sent a specimen of a large hydatidiform mole with the following history:

The patient, an Irish woman, twenty-five years old, was confined with her first baby May 23, 1891. Her menstrual periods returned in about two months after this date and appeared regularly until January 10th of this year. From this date to May 4th there was no menstrual flow, the patient during this time exhibiting all the symptoms of early pregnancy. On the latter date there was quite a copious flowing, which, however, subsided in three days. A few days later it began again and continued without interrup-

tion until June 3d, at which time the accompanying specimen was passed after very severe uterine pains lasting about twelve hours. The four weeks of flowing was unknown to me, the patient not having notified me. There was no pain whatever until twelve hours previous to the expulsion of the mole. Up to the present time the patient has been doing uninterruptedly well.

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DISCUSSION.

Dr. HOWLAND HOLMES, of Lexington :—I have, I think, had in my experience two cases of moles, and there were no very marked symptoms attached to them. Both patients did well, and the question has been in my mind, and talked over a little in our District Society. The view of some of the members is that these moles are pathologically the residue of a premature miscarriage. They are not independent growths, but there has been a pregnancy and the fœtus has perished, and the mole when it is expelled is the residue of that early pregnancy and is not a distinct growth of itself, independent from the living fœtus.

The Chairman, Dr. CHADWICK, of Boston :—I think I have had four of these cases in the last fifteen or eighteen years. There is nothing very peculiar about them, but I do not think there is any class of cases in which you learn more from a single case than from these. You have one case and you get a sort of picture. I don't mean to say it enables you to diagnosticate every case, but it gives you a sense of power. There is a very extraordinary increase in the size of the uterus and of the woman's abdomen, entirely out of proportion, as Dr. Craigin says, to the date of pregnancy. I do not know whether that case of uræmic convulsions was mine.

Dr. CRAIGIN :—It was.

Dr. CHADWICK :—One of my cases was seen in consultation with Dr. Elliott. Three of the cases in fact were on or near Hanover street. One with Dr Elliott was at the fourth month. The woman was as large as at the sixth month, and yet the data were very accurate. Of course it was not essential in that case to be absolutely certain of the diagnosis because she was having uræmic convulsions, three or four in one night, and the urine loaded with albumen. The thing was to empty the uterus, whether the contents were healthy or abnormal. In all cases the size was striking, and with the increase of the size I was struck with the apparent thinness of the uterus, and a certain amount of wavy contraction as though the uterus were seeking to expel its contents, not by one grand contraction, but by contracting in different sections. Then at a certain period you get hemorrhages, and even when the contents

are not expelled you get a good deal of hemorrhage. Taken in connection with the enlarged size, these hemorrhages with the reflex symptoms of nausea and discomfort give a pretty good picture, and then the thing to do is to empty the uterus and to prepare beforehand for every emergency. Get one or two assistants, have the patient thoroughly etherized, dilate the cervix forcibly, and go in and empty the womb. You will get out a pailful at the seventh month. The bleeding is tremendous. The only thing is to empty the organ and have at hand some water or ice, or (what I prefer to anything else) acetic acid, to inject into the uterus or swab it out. If you get an os pretty well dilated there is no trouble if everything is ready, but I have been extremely anxious in some of the cases, but succeeded in getting through all right.

Dr. CRAIGIN :—I did not understand Dr. Holmes, in speaking of the mole, whether he meant that it was independent of the impregnated ovum. It is generally accepted that it is.

Dr. HOLMES :—My own impression is that it is not independent of the ovum, but proceeds from the ovum, but as I said I know so little about it that I had better not tell you my theories.

Dr. CRAIGIN :—The only other thing to be mentioned is the size of the uterus. It may be deceptive if you depend upon enlargement for diagnosis, as it sometimes is much smaller than the corresponding time for normal pregnancy.

Dr. EDWARD REYNOLDS, of Boston :—I am in rather an unfortunate position, not having heard the paper, and I can only speak in a general way of a few points which have struck me forcibly. One is the difficulty of diagnosis. I have not had a very large experience in the hydatidiform mole, I am happy to say. The cases I have seen have been very largely, I think with one exception, either in the Lying-In Hospital with the advantage of consultation with other members of the staff there, or in cases I have happened to see in consultation. I think I never yet have seen a case where the diagnosis was made until the cysts began to escape, I mean where a positive diagnosis was made. I do not believe it is often possible to make a diagnosis until cysts are seen, and in my experience this

does not come till the first hemorrhage takes place. The history is often unreliable. The last case I saw was one in which I and one of the leading specialists of the city felt at liberty to exclude it because the history directly opposed it in every particular. We made no diagnosis, but concluded that the uterus contained a soft new growth which ought to be removed. It was removed, but it proved to be a hydatidiform mole. My own belief is that we must pay very little attention to the history, but must be content to assume the position that this is a uterus that ought to be emptied and not try to make a pathological diagnosis. I think that rapid enlargement of the uterus, enlargement beyond the estimated term of pregnancy, enlargement which makes one question whether it did not begin earlier than anticipated, in the presence of hemorrhage, is pretty suggestive.

As regards the treatment. It seems to me that the only point which offers difficulty is the presence of a rigid cervix. In case of a well-developed mole, with the uterus as large as at the sixth or seventh month of pregnancy, hemorrhage is liable to be overwhelming. I have seen in a case of hydatidiform mole a hemorrhage which unchecked I think would be fatal in five minutes. Should that occur in the presence of a rigid cervix, one which did not permit the half hand or two fingers at least to enter, I can conceive of no more difficult or dangerous case to deal with, and I have more than once felt very anxious indeed about the question of starting to interfere with a probable hydatidiform mole in the presence of a rigid cervix. The moment you begin to dilate the cervix the hemorrhage is likely to start, and if you cannot dilate any more it is a pretty tight place. I think the next time I meet such a case I shall content myself with a tight vaginal tamponade and wait for dilatation to take place under the efforts of nature. In my experience tight tamponade of the vagina is the most reliable of all means for accelerating labor if already present, and of provoking it. I believe if the physician makes the rule that having once inserted the tampon he will never be out of the patient's room until she is delivered that it is a tolerably safe proceedure. It involves devoting some hours to the case, but such a case is worth it. As soon as the os permits three fingers to enter it, if it were not dilating so

rapidly that there were a fair chance of getting the hand in, I should interfere in the presence of any considerable amount of hemorrhage. I believe the only thing to do is to attempt to get the mole out as quickly as possible, whichever way it can be done most easily in a given case. Often it can be pretty much expressed out.

Dr. HOLMES:—Dr. Chadwick remarked that three of his cases were on or near Hanover street. I may say with regard to my two cases that one was the aunt of the other. They were both from Nova Scotia, both young married women. Neither had borne children, and the second one, the niece of the first, was very delicate. She supposed she had been carrying a child for three or four months, and had a hemorrhage. I was called and used the various plans of arresting it, or retarding it, and keeping it within control, but still she lost so much blood that I decided to apply the tampon. Twelve to sixteen hours afterwards I removed the tampon, etherized the patient, and found a slight dilatation of the os so that I could introduce one finger easily. I made a forcible dilatation and removed the mole, and the hemorrhage ceased with that. The patient made a slow, but a good recovery.

Dr. CRAIGIN:—In regard to what Dr. Reynolds said in reference to diagnosis, practically it seems to be very difficult. Out of the twenty-five cases that I looked up only two I think had been diagnosticated before the uterus had been emptied.

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ARTICLE XXXII.

RESUMÉ OF 100 CASES OF OBSTETRICS AT THE KNOWLES MATERNITY, WORCESTER.

By GEORGE O. WARD, M.D.
OF WORCESTER.

READ JUNE 7, 1892.

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RESUMÉ OF THE FIRST ONE HUNDRED CASES, KNOWLES MATERNITY WARD, WORCESTER.

In July last, I completed a term of nearly two years' continuous service as assistant obstetrician in the Knowles Maternity Ward of the Worcester City Hospital, of which Dr. L. Wheeler is Obstetrician-in-chief.

With the completion of my term was rounded out an even one hundred "cases," thirty-seven of which were recorded under the term of Dr. R. W. Greene, my predecessor in office. My experience in the duties of this charge were exceedingly agreeable as well as instructive; and it suggested that a review of these cases would afford a proper subject for some discussion. The even number of one hundred, too, affords a convenient base to calculate percentages in such statistics as I shall give. Where data are thus classified the totals will not always reach an even hundred, because in some cases certain data could not for various reasons be obtained for record. Yet these exceptions will not materially alter percentages as read.

I endeavor not to present an arithmetical paper and trust that such figures as the record pages give naturally afford matter of interest, and to show that we have a Maternity Hospital in Worcester in which we endeavor, with fair success, to carry out and instruct our nurses in the best obstetric methods.

The Knowles Maternity Ward was opened for patients in June, 1888, and the first confinement was on the twelfth of that month. These one hundred cases, then, occurred in

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a period of a little over three years. There were in the first year twenty-six cases; in the second, thirty-seven; and in the third, thirty-four.

Of the patients, fifty-seven were foreign born, and forty-three were born in the United States. Of the latter, fourteen were born in Worcester, while eighty-seven claimed residence there. The average age was twenty-five years; and it is observed that the earlier patients were older than the later patrons. As to their connubial status, fifty-four were married, and forty-six were single; and again it is observed that the later patronage comprised more of the single class.

There were fifty-eight i-paræ (of which forty were single and eighteen were married); sixteen ii-paræ; eight iii-paræ; seven iv-paræ; two v-paræ; three vi-paræ; two vii-paræ; two viii-paræ, and one ix-para.

It is in point here to remark that cases of a certain class came, as it were, by epidemic,—now a long succession of single patients, perhaps all primiparæ, then again a series of married primiparæ or multiparæ.

Seven single women were pregnant for the second time; while two patients, both colored, were classified as doubtful on evidence of lesions of genital tract which pointed to previous confinement, though on their own avowal in both cases this lapse was their first experience of maternal joys and sorrows. There was one patient whose experience in the first year of the ward was such as to induce her to enter again for her confinement about two years later.

It may be interesting to note the hour of beginning of labor, and likewise of actual birth. I find that during ordinary sleeping hours (say between 8 P.M. and 7 A.M.), labor began in forty-six cases; while almost exactly the same number began during ordinary waking hours. The actual birth hour occurred in fifty-one cases between 7 A.M. and 8 P.M., and in thirty-eight cases between these hours

in reverse order. The presentation was head in all cases except five; of which three were simple breech; one a footling, and one a shoulder.

The position was made out in all possible cases, and was O.L.A. in sixty-three cases; O.D.P. in fifteen cases; O.D.A. in five cases; M.L.A. in one case; S.L.A. in three cases. The rest were premature cases or were brought to the ward to convalesce from confinement occurring outside hospital.

You will remember that our works on obstetrics give us a rule for determining (?) sex of child about to be born. If fœtal heart-rate be above 135 the child is likely to be a girl. If it be below 135, the child is probably of the other sex, and the further the heart-rate from 135, the stronger the probability in either case. An analysis of all cases where such record could be made shows forty-six cases evidencing in favor of this rule and thirteen cases against it.

The sexes of the new born were about evenly divided, there being forty-six boys and forty-eight girls.

An outline is here appended of the routine aseptic treatment in which the nurses are carefully instructed.

1. On entrance, if patient is in first stage, she is given tub-bath; if in second stage, a bath in bed.

2. Bowels are emptied by enema.

3. Vaginal douche of bichloride, 1 to 3000.

4. After delivery of placenta (which is usually expressed by Crédé's method at same time with uterine contraction if possible), another vaginal douche of same strength.

6. Wet towel (bichloride 1 : 3000) placed over vulva; and uterus held by nurse's hand for half hour, or until good contraction is had.

7. Genitals bathed with bichloride 1 to 3000. Binder and obstetric absorbent pad applied.

10. Genitals sprayed with bichloride 1 : 3000 at each change of pad, urination or defæcation.

11. Nurse always to make her hands aseptic before touching patient for any purpose in region of genitals.

The infants are carefully measured from vertex to heel of extended leg, and the average length was found to be 19.66 inches. Likewise the weight is taken (in nude state) and this averages almost exactly 7 lbs.; the largest at full term weighing $11\frac{3}{16}$; and the smallest $4\frac{8}{16}$.

The placenta (drained of accompanying blood clots, &c.) is weighed with cord, and in cases here considered is found to average 22 oz.; the heaviest weighing 32 oz., and the lightest 15 oz. The cord also, carefully measured, averaged 22 inches in length; the longest being 40 inches, and the shortest being 16 inches.

In making a classification of the one hundred labors, I have grouped them as—1st, normal at term (*i.e.* where no interference was made with nature's efforts); sixty-nine cases; 2d, premature, fifteen cases; 3d, forceps, eleven cases; 4th, confined outside and brought to us for convalescence, four cases; 5th, version (for eclampsia), one case.

Before presenting the data as to condition of perineum after these labors, let me say that it was my practice (and I am confident that of my predecessor as well) *always* to carefully examine for internal as well as external tears, even for those of the mucous membrane only. Many superficial tears were closed simply as aseptic measures; but where even for this reason only sutures were employed, the perineum is classed as lacerated in the following statement: lacerated thirty-one, of which twenty-six united fully, while five failed of good union. In multiparæ there were seventeen old lacerations which gave sufficient extra room for exit of head as to enable the patient to escape a second tear. On the other hand, of the fifty-eight primiparæ, twenty-nine escaped with perineum intact; seventeen without the slightest internal or external tear; while thirteen multiparæ with normal perineum had fortune equally as good as their less experienced sisters just mentioned.

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In the normal cases, the average duration of labor was found to be for the first stage, thirteen hours; for the second stage, one hour and three minutes; for the third stage, ten minutes.

Our temperature charts carefully record the A.M. and P.M. temperature for at least ten days. I have analyzed them after the plan of Dr. W. L. Richardson's monograph on Antiseptic Midwifery, based on charts of the Boston Lying-In Hospital. I find the acme of temperature in first ten days nearest:

99°	in	51	cases.
100°	"	18	"
101°	"	11	"
102°	"	6	"
103°	"	3	"
104°	"	4	"
105°	"	2	"

Post-partum examination as to condition of cervix, perineum, position and depth of uterus was had in most cases, two weeks after confinement.

Of the perineum data have already been given. As to cervix, there were normal twenty-seven; unilateral lacerations to right, one; to left, sixteen; bi-lateral lacerations, thirty-five; stellate lacerations, six.

Position determined bi-manually and by use of sound, was found to be

Normal in sixty	cases.
Anteflexion in seventeen	"
Retroflexion in one	"
Anteversion in seven	"
Retroversion in five	"
Lateral version in two	"

The depth averages almost nearly three and one-half inches.

Beside the fifteen premature cases already noted, there were six still-births or dead children; in one of which the

evident cause of death was strangulation by cord about the neck.

There were five other deaths of children. One was from convulsions, probably due to compression of forceps in delivery, the presentation being face; but there was no external abrasion and the cause was not confirmed, as no post mortem was had.

The second death was of a "blue baby," living only five hours, in spite of all possible aid rendered.

The third death was of child delivered by high forceps (Tarnier). Child lived twelve hours and died in convulsion.

The fourth death was that of child, hydrocephalic with spina bifida. Child lived five days.

The fifth death was of child brought in from outside in ambulance. It was born at the house of a midwife, the presentation being breech. Had ceased to breath on arrival, but was manipulated for an hour or two before respiration was well established. Lived for several weeks, but only by aid of stimulants, electricity, etc.

There was one case of specific disease, the first on record-book, where child showed lesions also, and subsequent history of mother gives several mis-carriages. There were two cases of firmly adherent placentæ, which after repeated ineffectual efforts to express by Crédé's method, were, under aseptic precautions, removed manually.

There were two cases where O.D.P. failed to rotate and child was born face to pubes.

There was one anencephalic monster (premature).

Of the three cases classed as breech, one was the outside case just referred to. The second was a short labor without incident. The third was a i-para, eleven hours in labor; the child being the largest in the series, weighing $11\frac{3}{16}$ pounds. The cord was prolapsed and not replaceable, and child was still-born.

Of the eleven forceps cases, one only was for head at

superior strait. Patient was a i-para, and had been twenty-seven hours in labor before interference was made by Tarnier forceps. Of the other ten; in seven, forceps were resorted to on account of inefficient uterine power after second stage of two to five hours. Of the remaining three cases, one was face presentation, one for justo-minor pelvis, and two were for eclampsia.

There were three cases of contracted pelvis. The first was the justo-minor pelvis (just mentioned) of a colored ii-para whose former child was delivered in another city by forceps. This woman was delivered of a living child by forceps. The external diameters were in her case about one inch less than normal.

The second case was of a Swede, whose antero-posterior internal diameter was $3\frac{3}{4}$ in. with walnut-like process on promontory. The child was dead and macerated.

In the third case, the patient was a fat Irish woman who had had an eventful experience in the course of ten years as ix-para in hands of several reputable practioners, several of whom were present at each confinement. The supposed cause was contracted pelvis, but she was so fat that accurate measurements could hardly be taken, but such as were made in hospital did not show material narrowing. Still in view of her previous history, labor was induced at eighth month as near as could be determined. Twelve hours after catheter was introduced into uterus labor began, and after few pains female child weighing $5\frac{9}{16}$ pounds was expelled. It lived and was discharged well.

There were three cases of eclampsia. The first case furnished the only fatality among our mothers. This patient entered after having had several convulsions. Labor was hastened by manual dilatation and she was delivered by forceps; but in spite of usual treatment for such cases, died about three hours after entrance and less than one hour after delivery.

The second had two convulsions previous to delivery and one several hours afterward; was delivered by forceps of living child. Both mother and child made good convalescence.

The third case entered in typical eclamptic condition. Had seven convulsions in as many hours preceding delivery, which was accomplished by manual dilatation and version. Child was still-born. Patient had eleven convulsions in the next twenty-four hours, in spite of most active treatment for her uræmic condition. She was semi-comatose for two days subsequent to delivery, but eventually made good recovery in two weeks.

Finally, we have to report among our 100 cases six which are fairly open to suspicion of septic infection. It would not be especially profitable to enter into cases in detail. Suffice it to say that we seek for a reasonable cause for every marked rise of temperature. In every case where infection of the genital tract is suspected, vaginal examination is at once made, intra-uterine douche, 1 to 3000 bichloride given. Iodoform suppositories placed in utero, lesions of cervix or vagina dusted with iodoform, and systemic treatment added if needed.

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Massachusetts Medical Society.

PROCEEDINGS.

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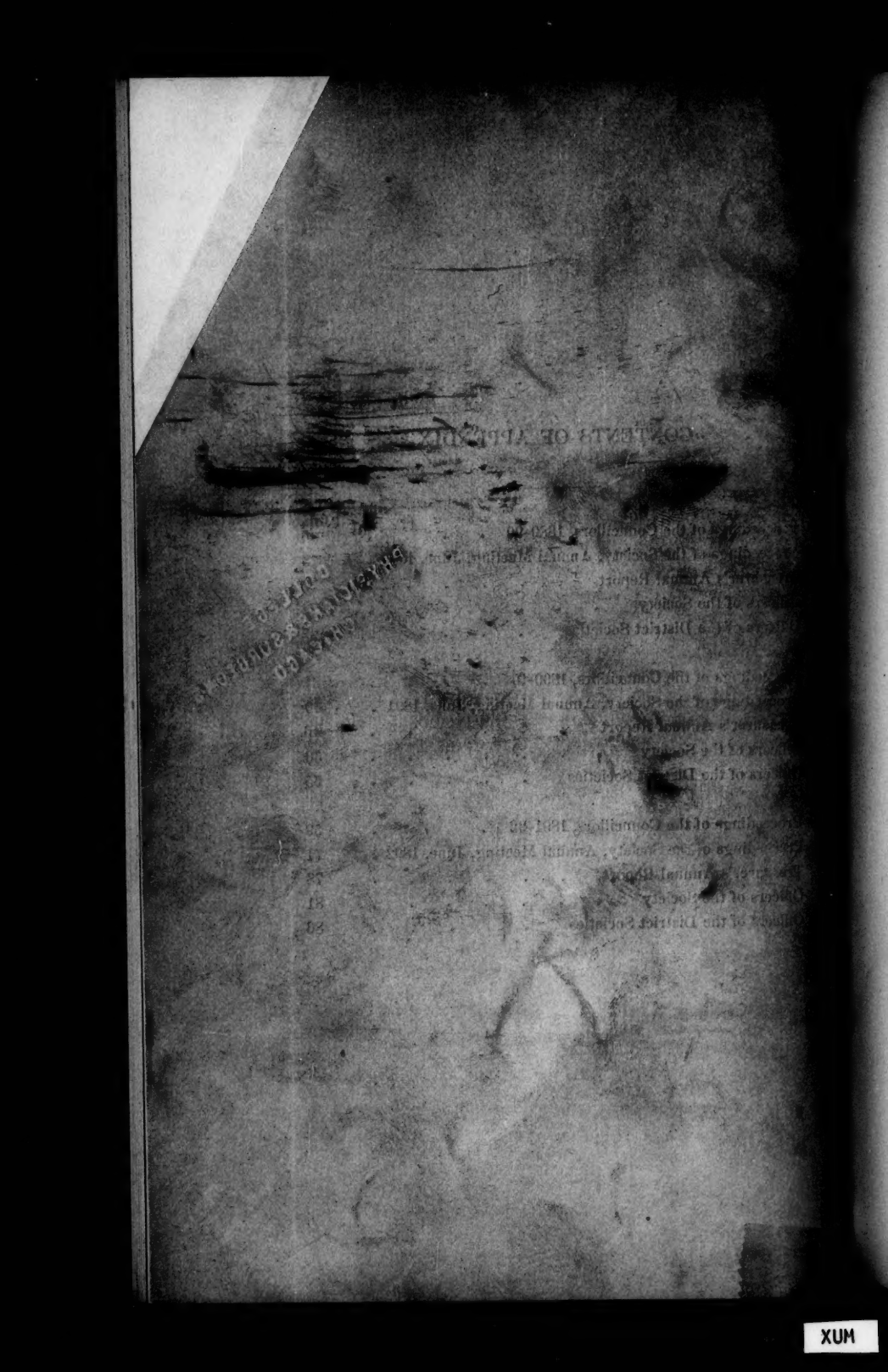

Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

OCTOBER 2, 1889.

A STATED MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 2, 1889, at 11 o'clock, A.M.

The President, Dr. DAVID W. CHEEVER, in the chair.

The following Councillors were present:

Barnstable.
C. M. Hulbert.

Bristol North.
F. A. Hubbard,
S. D. Presbrey.

Bristol South.
D. E. Cone,
G. L. Ellis,
J. H. Jackson,
W. H. Taylor.

Essex North.
J. Crowell,
F. A. Howe,
G. Montgomery,
F. E. Weil.

Essex South.
H. Colman,
E. A. Kemp,
C. C. Sheldon.

Middlesex East.
A. H. Cowdrey.

Middlesex North.
J. H. Gilman.

Middlesex South.
Z. B. Adams,
C. H. Cook,
D. M. Edgerly,
R. L. Hodgdon,
H. Holmes,
A. Nott,
G. A. Oviatt,
G. J. Townsend,
H. P. Walcott,
A. C. Webber,
W. W. Wellington,
M. Wyman.

Norfolk.
G. W. Clement,
B. E. Cotting,
E. F. Dunbar,
W. S. Everett,
D. S. Fogg,
E. P. Gerry,
H. P. Jaques,
A. D. Kingsbury,
H. R. Stedman.

Norfolk South.
G. W. Tinkham.

Plymouth.
J. C. Gleason,
B. F. Hastings.

Suffolk.
S. L. Abbot,
C. J. Blake,
F. E. Bundy,
J. R. Chadwick,
D. W. Cheever,
O. W. Doe,
F. W. Draper,

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R. H. Fitz,
C. F. Folsom,
W. C. Holyoke,
J. Homans,
W. Ingalls,
F. I. Knight,
A. L. Mason,
A. E. McDonald,
F. Minot,
C. B. Porter,
A. Post,
J. P. Reynolds,
W. L. Richardson,
T. M. Rotch,
A. D. Sinclair,
G. G. Tarbell,
J. C. Warren,
A. P. Weeks,
H. W. Williams.

Worcester.

G. Brown,
G. E. Francis,
W. H. Lincoln.

Total, 69.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies.

Vermont.—Drs. R. C. Ward, of Northfield; J. H. Gilman, of Lowell.

New York.—Drs. H. Colt, of Pittsfield; C. W. Cooper, of Northampton.

The Committee on Membership and Finances reported through Dr. Minot. In accordance with their recommendation the following were allowed to retire:

J. R. Brown, of Springfield.
William Holbrook, of Palmer.
H. A. Jewett, of Northboro'.
C. L. Knowlton, of Northampton.
P. A. Stackpole, of Dover, N. H.

Also the following were dropped from the roll for five years' delinquency in assessments:

W. P. Cutter, of Pepperell.
A. J. Gray, San Diego, Cal.
J. A. McDonough.

The following was elected to Honorary Membership:

A. Anagnostakis, of Athens, Greece.

Adjourned at 11.45, A.M.

FRANCIS W. GOSS,
Recording Secretary.

February 5, 1890.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 5, 1890, at 11 o'clock, A.M.

The President, Dr. David W. Cheever, in the chair.

The following Councillors were present:

Berkshire.
F. K. Paddock.

Bristol North.
S. D. Presbrey.

Bristol South.
W. Butler,
G. L. Ellis,
W. H. Taylor.

Essex North.
J. Crowell,
R. B. Root,
F. E. Weil.

Essex South.
H. Colman,
G. S. Osborne,
C. C. Sheldon.

Middlesex East.
A. H. Cowdrey,
J. M. Harlow.

Middlesex North.
N. B. Edwards,
J. H. Gilman,
J. C. Irish,
W. H. Lathrop.

Middlesex South.
C. H. Cook,
D. M. Edgerly,
R. L. Hodgdon,
H. Holmes,
G. C. Pierce,
F. E. Porter,
G. J. Townsend,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis,
M. Wyman.

Norfolk.
C. A. Bemis,
H. W. Broughton,
J. W. Chase,
G. W. Clement,
B. E. Cotting,
E. F. Dunbar,
H. C. Ernst.

Plymouth.
H. W. Dudley,
J. C. Gleason,
B. F. Hastings,
A. E. Paine.

Suffolk.
S. L. Abbot,
H. J. Barnes,
J. F. Bush,
A. T. Cabot,
J. R. Chadwick,
D. W. Cheever,
O. W. Doe,
F. W. Draper,
T. W. Fisher,
M. F. Gavin,
J. O. Green,
F. B. Greenough,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
G. H. Lyman,
A. L. Mason,
A. E. McDonald,
F. Minot,
A. Post,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
B. S. Shaw,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
J. C. Warren,
A. P. Weeks,
J. C. White,
E. Wigglesworth,
H. W. Williams.

Worcester.
G. Brown,
W. Davis,
G. E. Francis,
G. C. Webber,
L. Wheeler.

Worcester North.
R. F. Andrews.

Total, 81.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. G. Ryder, Jr., of Malden; W. G. Eaton, of Lowell.

New Hampshire.—Drs. E. A. Kemp, of Danvers; G. M. Garland, of Boston.

Rhode Island.—Drs. C. N. Chamberlain, of Lawrence; H. F. Borden, of Brockton.

Connecticut.—Drs. G. L. Woods, of Springfield; F. H. Zabriskie, of Greenfield.

New Jersey.—Drs. F. H. Hooper, of New Bedford; J. W. Goodell, of Lynn.

The following Committees were appointed:

To Audit the Treasurer's Accounts.—Drs. J. S. Greene, S. W. Driver.

To Examine the By-Laws of District Societies.—Drs S. D. Presbrey, J. C. White, F. W. Chapin.

The Committee on Membership and Finances reported through Dr. Minot. In accordance with their recommendation the following were allowed to resign:

F. J. B. Cordeiro, of U. S. Navy.
Bessie C. Earle, of Grand Rapids, Mich.
A. E. Garceau, of Chicago, Ill.
C. S. Wheeler, of Lennox, Dak.

Also the following were allowed to retire:

O. E. Hunt, of Newtonville.
W. D. Lamb, of Southbridge.

Also the following were dropped from the roll for five years' delinquency in assessments:

T. F. Roche, of Clinton.
C. P. Woodman, of Essex.

Also the following, having forfeited membership by removal from the State and non-payment of dues, were dropped from the roll:

G. D. Barrett, of Marengo, N. Y.
Josef Bechtinger, of Brazil.
G. P. Bell, of East Chatham, N. Y.
G. H. Desjardins, of Montreal, Can.
H. W. Dewey, of New York, N. Y.
W. P. Giddings, of Gardiner, Me.
J. G. Hayes, of Atlanta, Ga.
J. W. Keene, of Buffalo, N. Y.
W. H. Leighton, of Milwaukee, Wis.
Daniel Pickard, of Canterbury, N. H.
J. W. Robbins, of Texas.
E. P. Stone, of U. S. Navy.
O. A. Wheeler, of Monrovia, Cal.

Also the following was restored to membership:

William Thornton Parker, of Newport, R. I.

Dr. B. Cushing, Chairman of the Committee appointed in June last on the laws relating to the Commitment of the Insane, reported "Inexpedient to take action."

Adjourned at 11.40, A.M.

FRANCIS W. GOSS,
Recording Secretary.

JUNE 10, 1890.

THE ANNUAL MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 10, 1890, at 11 o'clock, A.M.

The President, Dr. DAVID W. CHEEVER, in the chair.

The following Councillors were present:

Barnstable.	*Berkshire.*	*Bristol North.*
H. S. Kelley, Jr.,	I. R. Sanford.	A. S. Deane,
F. W. Pierce.		E. F. Galligan,
		S. D. Presbrey.

Bristol South.
G. L. Ellis,
A. M. Pierce,
W. H. Taylor.

Essex North.
C. G. Carleton,
F. B. Flanders,
J. Peirce.

Essex South.
C. A. Ahearne,
F. S. Atwood,
C. Burnham,
D. Coggin,
F. E. Hines,
A. H. Johnson,
C. C. Sheldon,
F. D. S. Stevens.

Franklin.
A. C. Deane,
R. C. Ward.

Hampden.
G. E. Fuller.

Hampshire.
E. H. Guild.

Middlesex East.
J. M. Harlow,
P. Sheldon.

Middlesex North.
J. J. Colton,
N. B. Edwards.
C. I. Fisher,
H. P. Jefferson.

Middlesex South.
Z. B. Adams,
S. W. Driver,
T. M. Durell,
J. B. Everett,
D. M. Edgerly,
E. Farnham,
W. H. Hildreth,
R. L. Hodgdon,
H. Holmes,
A. F. Holt,
E. G. Hoitt,
G. A. Oviatt,
L. R. Stone,
A. C. Webber,
W. W. Wellington,
J. W. Willis,
M. Wyman.

Norfolk.
W. P. Bolles,
W. Channing,
B. E. Cotting,
B. Cushing,
E. F. Dunbar,
H. C. Ernst,
W. S. Everett,
W. C. B. Fifield,
E. P. Gerry,
A. D. Kingsbury,
C. E. Stedman,
H. R. Stedman,
C. F. Withington.

Norfolk South.
S. M. Donovan,
J. C. Fraser,
G. W. Tinkham.

Plymouth.
H. W. Dudley,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
H. J. Barnes,
E. H. Bradford,
E. H. Brigham,
F. E. Bundy,
A. T. Cabot,
B. F. Campbell,
J. R. Chadwick,
D. W. Cheever,
J. W. Cushing,
F. W. Draper,
S. H. Durgin,
T. W. Fisher,
C. F. Folsom,
M. F. Gavin,
C. M. Green,
F. B. Greenough,
W. C. Holyoke,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
A. E. McDonald,
F. Minot,
J. P. Reynolds,
W. L. Richardson,
A. D. Sinclair,
A. M. Sumner,
C. W. Swan,
O. F. Wadsworth,
J. C. Warren,
J. C. White,
E. N. Whittier,
H. W. Williams.

Worcester.
M. Bemis,
A. G. Blodgett,
W. Davis,
T. H. Gage,
E. B. Harvey,
H. A. Jewett,
W. H. Lincoln,
J. O. Marble,
G. M. Morse,
W. E. Rice,
E. Warner,
G. C. Webber,
H. W. Wheeler.

Worcester North.
R. F. Andrews,
G. D. Colony,
J. R. Greenleaf,
B. H. Hartwell.

Total, 116.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Draper, read his annual report.

The Auditing Committee reported that they found the accounts properly vouched and correctly cast.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Minot and recommended that two fifths of the surplus in the treasury, amounting to $1382.00, be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation by the same Committee it was voted that the following be allowed to resign:

C. J. Foote, of New Haven, Conn.
F. E. Mayberry, of Hoosick Falls, N. Y.
D. M. Sheedy, of Poughkeepsie, N. Y.
F. M. Welles, of Chelsea.
Royal Whitman, of New York, N. Y.
C. A. Wheaton, of St. Paul, Minn.

Also that the following be allowed to retire:

E. T. Eastman, of Boston.
R. L. Hodgdon, of Arlington.
Peter Pineo, of Hyannis.
J. W. Snow, of Somerville.
W. E. Sparrow, of Mattapoisett.

The Committee on Publication presented their report.

The Committee on the By-Laws of the District Societies presented their report.

The Librarian, Dr. Brigham, made his annual report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

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President . .	Dr. AMOS H. JOHNSON, of Salem.
Vice-President . .	Dr. GEORGE D. COLONY, of Fitchburg.
Treasurer . .	Dr. FRANK W. DRAPER, of Boston.
Corresponding Secret'y	Dr. CHARLES W. SWAN, of Boston.
Recording Secretary .	Dr. FRANCIS W. GOSS, of Roxbury.
Librarian . .	Dr. EDWIN H. BRIGHAM, of Boston.

Dr. JAMES B. BREWSTER, of Plymouth, was chosen Orator, and

Dr. THEODORE F. BRECK, of Springfield, Anniversary Chairman, for the Annual Meeting of the Society in 1891.

Voted,—That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1891.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

O. K. Newell, H. L. Burrell, J. Homans, 2d,
V. Y. Bowditch, R. W. Lovett, J. T. Bowen.

On Publications.

G. C. Shattuck, B. E. Cotting, O. F. Wadsworth.

On Membership and Finances.

F. Minot, B. S. Shaw, J. Stedman,
E. G. Cutler, L. R. Stone.

To Procure Scientific Papers.

H. P. Walcott, E. H. Bradford, L. Wheeler,
C. W. Cooper, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, C. Howe,
F. C. Shattuck, C. G. Carleton.

On Medical Diplomas.

E. J. Forster, F. S. Watson, F. H. Hooper.

A petition that a portion of the boundary line between Norfolk and Suffolk Districts be changed was referred to the Presidents of the Norfolk, Suffolk and Middlesex South Districts, as a Committee to report at a future meeting.

Adjourned at 12.15, P.M.

FRANCIS W. GOSS,
Recording Secretary.

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

Sectional meetings of the Society were held in the Building of the Massachusetts Charitable Mechanic Association, Boston, on Tuesday, June 10, 1890, at 2 o'clock, P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. A. H. Johnson, of Salem . . . Chairman.
Dr. Henry Jackson, of Boston . . . Secretary.

The Influenza and Insanity: A Clinical Report of Cases.—By Dr. A. H. Harrington, of Danvers. Discussion by Drs. W. Channing, T. W. Fisher, J. O. Whitney, H. R. Stedman.

The Care of the Insane in Local Institutions. By Dr. A. R. Moulton, of Boston. Discussion by Drs. H. R. Stedman, M. Bemis, T. W. Fisher, W. Channing.

The Indications for Operations Involving the Opening of the Vertebral Canal.—By Dr. J. J. Putnam, of Boston.

The True Position of Electricity as a Therapeutic Agent.—By Dr. Morton Prince, of Boston.

SECTION IN SURGERY.

Dr. D. W. CHEEVER, of Boston . . . Chairman.
Dr. M. D. CLARKE, of Haverhill . . Secretary.

IRREDUCIBLE HERNIA.—Discussion by Drs. J. C. Warren, G. W. Gay, H. W. Cushing, Walter Ela, C. W. Galloupe, F. H. Thompson, F. W. Chapin and the Chairman.

SECTION IN OBSTETRICS AND GYNECOLOGY.

Dr. J. P. REYNOLDS, of Boston . . . Chairman.
Dr. GEORGE HAVEN, of Boston . . . Secretary.

Papers were read as follows:

A CASE OF PROTRACTED LABOR, RESULTING IN ATRESIA OF THE VAGINA.—By Dr. A. H. Hodgdon, of Dedham. Discussion by Drs. E. W. Cushing, F. H. Davenport.

THREE CASES OF LAPAROTOMY FOR GENERAL PERITONITIS.—By Dr. Leonard Wheeler, of Worcester. Discussion by Drs. A. T. Cabot, R. H. Fitz, J. W. Elliot, H. O. Marcy, J. F. A. Adams, A. Worcester, W. C. B. Fifield.

OBSTETRICAL WORK IN A COTTAGE HOSPITAL.—By Dr. Henry Colt, of Pittsfield. Discussion by Dr. C. M. Green.

At 8 o'clock, P.M., the Shattuck Lecture was given by Dr. GEORGE B. SHATTUCK, of Boston.

FRANCIS W. GOSS,
Recording Secretary.

SECOND DAY.

THE Society met in Mechanics' Building, Boston, on Wednesday, June 11, 1890, at 9 o'clock, A.M., for the exercises of the one hundred and ninth Anniversary.

The President, Dr. DAVID W. CHEEVER, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary read the names of Fellows admitted since the last annnal Meeting, and of Fellows whose deaths had been reported.

Fellows admitted since June 11, 1889.

1889	Bates, Everett Alanson	Boston.
1890	Bédard, Joseph Armand	Lynn.
1890	Berry, Lamiston M.	Chicopee Falls.
1890	Blakeslee, Charles Lewis	Westfield.
1889	Bond, Willis George	Revere.
1889	Brown, Windsor Aldrich	Oakham.
1889	Bullard, John Thornton	New Bedford.
1889	Burr, Chauncey Rea	Boston.
1889	Campbell, Patrick Henry	Boston.
1890	Clark, Caleb Wakefield	Holbrook.
1890	Clark, Walter Thomas	Worcester.
1889	Cobb, Frederic Codman	Boston.
1890	Crocker, Willard Crafts	Foxboro'.
1890	Churchill, Frank Spooner	Boston.
1889	Draper, Joseph Rutter	South Boston.
1889	Eliot, George	Boston.
1889	Garceau, Edgar	Boston.
1889	Gibson, Charles Langdon	New York, N. Y.
1890	Greene, Robert Anderson	Worcester.
1890	Halpin, Andrew James	Lowell.
1890	Harding, George Franklin	Boston.
1890	Harlow, Corydon Webster	Melrose.
1889	Harrington, Arthur Hudson	Danvers.
1889	Hastings, Daniel Gott	Rochester, N. Y.
1889	Hipkiss, George	Chattanooga, Tenn.
1889	Holden, Eugene Martin	Boston.
1890	Hoyt, Walter Scott	Waltham.
1889	Hyde, Seneca Tobias	Dorchester.
1889	Kean, Michael Edward	Manchester, N. H.
1889	Keegan, Charles Andrew	Marlborough.
1889	Kellogg, Helen Raynolds	Roxbury.
1889	Knowles, James Harris	Gloucester.
1889	Lacherzack, Bernard	Boston.
1890	Lavoie, Arthur	Salem.
1889	Lockhart, Joseph Smith	Boston.
1890	Lussier, Charles Arthur	North Grafton.
1889	Macarthy, George Elden	Ipswich.
1890	McCarthy, Thomas Horatio	East Boston.
1890	McCormack, Reynold James	Salem.
1889	McFarlane, Andrew	Roslindale.

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1890	Meigs, Joe Vincent, Jr.	Lowell.
1889	Mooers, Emma Wilson	Arlington.
1889	Morris, John Gavin	South Boston.
1889	Mumford, James Gregory	Boston.
1890	Nickerson, Chauncey John	Lowell.
1890	Noyes, Nathaniel Kingsbury	Boston.
1890	Patterson, John Henry	Harwich.
1889	Pelton, Clarence Whitfield	Dedham.
1889	Pinckard, Charles Philip	Boston.
1890	Porter, Ida May	Tewksbury.
1889	Pothier, Joseph Charles	New Bedford.
1890	Randell, Charles Leonard	Tewksbury.
1889	Reynolds, Henry Vose	Dorchester.
1890	Roberts, George Kerr	Mansfield.
1889	Seelye, Ralph Holland	Boston.
1889	Shaw, Henry Alden	Boston.
1889	Smith, Murdoch Campbell	Lynn.
1889	Stone, George Arthur	Ipswich.
1889	Swett, Eddy Benjamin	Marlboro'.
1889	Thomas, John Jenks	Boston.
1890	Tibbetts, James Thomas	Roxbury.
1890	Tigh, Frederick	Newburyport.
1889	Underhill, Charles Dudley	Boston.
1889	Wheaton, Robert Archibald	Boston.
1889	Whittemore, Frank Stowell	Boston.
1889	Wilbur, Hubert Granville	Boston.
1890	Wiley, Alfred Soule	Newton Highlands.

Total, 67.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1837	Babbitt, Nathan Snell	No. Adams	Nov. 5, 1889	77
1838	Brooks, Alphonso	South Boston	Sept. 30, 1889	89
1864	Brown, Francis Frederick	Reading	Jan. 13, 1890	55
1871	Burden, Frederick Lysander	No. Attleboro'	Feb. 23, 1890	42
1871	Burke, John	Boston	June 21, 1889	42
1846	Chapman, Thomas Luce	Springfield	Aug. 20, 1889	72
1856	Crowell, John	Haverhill	April 28, 1890	66
1834	Denniston, Edward Evans	Northampton	May 10, 1890	87
1863	Emerson, James	Gardner	Jan. 21, 1890	62
1861	Fearing, Benjamin	Wareham	Dec. 26, 1889	65
1883	Goodhue, Perley Eben	Haverhill	May 19, 1890	31
1846	Greene, Moses Collins	Somerville	Nov. 20, 1889	79
1840	Grosvenor, David Augustus	Danvers	Sept. 27, 1889	77
1848	Haddock, Charles	Beverly	Oct. 10, 1889	67
1874	Hoar, William Michael	Lowell	Jan. 13, 1890	40
1836	Inches, Herman Brimmer	Boston	Aug. 19, 1889	76
1842	King, John Bowne	Nantucket	July 27, 1889	81
1887	Libby, George Wesley Harding	Worcester	July 31, 1889	28
1855	Lynde, James Porter	Athol	Jan. 21, 1890	62

1852	Mann, Jonathan	Boston	June	15,	1889	73
1860	Nichols, George Henry	Cambridge	Feb.	5,	1890	75
1879	Phelan, Arthur Quinn	Lowell	Jan.	7,	1890	42
1877	Read, George Mumford	Dorchester	March	16,	1890	33
1844	Russell, Le Baron	Boston	Aug.	19,	1889	75
1833	Seabury, Benjamin Franklin	Orleans	Feb.	26,	1890	82
1870	Shannon, James Griswold	Rutland	Dec.	29,	1889	46
1854	Stickney, James Milton	Pepperell	Nov.	28,	1889	76
1857	Thompson, Austin White	Northampton	July	11,	1889	55
1874	Tobien, Albert Sylvester	Templeton	May	10,	1890	45
1851	Trow, Josiah	Buckland	Feb.	15,	1890	73
1839	Ufford, Edward Goodrich	Agawam	Aug.	25,	1889	85
1838	Wales, Bradford Leonard	Randolph	May	13,	1890	86
1869	Warner, Levi Farr	Boston	Oct.	12,	1889	68
1867	Weston, Edward Henry	Somerville	March	28,	1890	70
1866	Wilson, Arthur Henry	South Boston	May	11,	1890	51
1875	Winn, William Adams	Arlington	Jan.	19,	1890	41

Total, 36

The Treasurer, Dr. Draper, presented his annual report.

Dr. C. Irving Fisher stated that at a recent meeting of the Suffolk District Society, a Committee was appointed to favor legislative enactment to prevent the spread of Syphilis by Paupers and Criminals.

He requested, and the Society voted, that each District Society be recommended to appoint a Committee whose duty it shall be to see that the matter is properly presented to the members of the Legislature of 1891 from their respective Districts.

The following papers were read:

Some Relations of Climate to Health and Disease.—By Dr. W. E. Smith, of Boston.

Mushrooms and Mushroom Poisoning.—By Dr. E. J. Forster, of Charlestown.

Dangers from Defective Form and Color Sense, and their Control.—By Dr. B. J. Jeffries, of Boston.

The Treatment of Uterine Fibro-myomata by Abdominal Hysterectomy.—By Dr. J. C. Irish, of Lowell.

The following delegates from other Societies were present at the meetings:

Maine.—Dr. H. F. Twitchell.
New Hampshire.—Dr. I. J. Prouty.
Rhode Island.—Dr. J. M. Peters.
New York.—Drs. C. A. Powers, C. A. Dewey.

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At 12 o'clock the Annual Discourse was delivered by Dr. JAMES C. WHITE, of Boston.

At the close of the oration a vote of thanks was presented to the orator for his interesting, timely and suggestive address.

The President introduced the President-elect, Dr. AMOS H. JOHNSON, of Salem.

At 1, P.M., the Annual Dinner, presided over by the Anniversary Chairman, Dr. JOSEPH STEDMAN, was served to about seven hundred and fifty Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer respectfully submits the following report of the Society's finances during the year ending April 15, 1890:—

Balance from last account . .	$3301 71
Receipts from all other sources . .	9218 78
	$12520 49
Expenses	9065 29
Balance to new account . .	$3455 20

The receipts and disbursements are shown in detail in the accompanying balance-sheet.

The Treasurer congratulates the Society that, financially, the past year has been the most prosperous in its history.

The invested funds have remained without change since the last report; they amount to $33,420.17, distributed as follows:

Shattuck Fund	$9166 87
General Fund	11253 30
Phillips Fund	10000 00
Cotting Fund	3000 00

During the past year, these funds have yielded interest to the amount of $1,378.39.

Since April 15, 1889, assessment-dues to the amount of twenty-five dollars have been remitted, by vote of the Councillors, upon the recommendation of the Committee on Membership and Finances.

By order of the Councillors, also, thirteen members have forfeited their place on the Roll of Fellows by removal from Massachusetts and neglect of their assessment-obligations; and six members have been dropped, in accordance with the By-Laws, on account of five years' unexcused delinquency in the payment of their Society dues.

Twelve Fellows have resigned their membership during the year, and one has been restored.

The Society now bears on its Rolls the names of 1691 members.

Respectfully submitted.

F. W. DRAPER,

Boston, May 27, 1890. *Treasurer.*

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Dr. **F. W. Draper, Treasurer, in account with**

Income.

Balance from last account		$3301 71
Assessments paid to the Treasurer		1620 00
Assessments collected by District Treasurers:—		
Barnstable	100 00	
Berkshire	110 00	
Bristol North	150 00	
Bristol South	235 00	
Essex North	365 00	
Essex South	340 00	
Franklin	130 00	
Hampden	290 00	
Hampshire	160 00	
Middlesex East	130 00	
Middlesex North	405 00	
Middlesex South	710 00	
Norfolk	705 00	
Norfolk South	105 00	
Plymouth	135 00	
Suffolk	1350 00	
Worcester	575 00	
Worcester North	150 00	
		6145 00
Interest Account:—		
General Fund	450 12	
Phillips Fund	400 00	
Shattuck Fund	366 67	
Cotting Fund	161 60	
Interest on cash-balance in Savings Banks	60 39	
		1438 78
Extra Dinner Tickets sold June 11, 1889		10 00
Censor's fine for neglect of duty		5 00
		$12520 49

The Committee appointed to audit the Treasurer's accounts have carefully attended to that duty, and respectfully report that they find the accounts properly vouched and correctly cast.

The balance on hand is $3,455.20.

Securities representing the invested funds have been inspected, and are found to have the face value of $33,420.17.

JAMES S. GREENE,
STEPHEN WM. DRIVER.

Boston, May 10, 1890.

the Massachusetts Medical Society. Cr.

Expenses.

On account of Annual Meeting, 1889:—		
Caterer	$1700 00	
Cigars	94 00	
Incidentals	29 75	
Music	104 00	
Printing	30 96	
Rent of Mechanics' Building	375 00	
Stenographers' services	39 00	
		$2372 71
Committee on Ethics and Discipline, mileage account		12 10
Committee on Publications:—		
Braithwaite's Retrospect	2530 00	
Communications and Transactions, 1889	695 91	
		3225 91
Councillors' Orders:—		
"Cotting Lunches" at Councillors' meetings		50 00
District Societies' Account:—		
Censors-at-large, for advertising, etc.	34 87	
Censors' fees for examining candidates	225 00	
Dividend for 1889	1320 68	
District Treasurers' fees and expenses	344 21	
		1924 76
Librarian's Expenses:		
Allowance for Clerk	50 00	
Incidentals	26 80	
Postage and express charges	375 00	
Stationery	4 25	
		456 05
Recording Secretary's Expenses:—		
Incidentals	1 38	
Printing and Postage	140 20	
Salary	250 00	
		391 58
Treasurer's Expenses:—		
Printing and Postage	72 38	
Salary	400 00	
Stationery,	9 80	
		482 18
Rent to January 1, 1890		150 00
		9065 29
Balance to new account, April 15, 1890		3455 20
		$12520 49

Officers of the Massachusetts Medical Society.

1890—1891.

Chosen June 10, 1890.

AMOS H. JOHNSON,	Salem,	President.
GEORGE D. COLONY,	Fitchburg,	Vice-President.
FRANK W. DRAPER,	Boston,	Treasurer.
CHARLES W. SWAN,	Boston,	Cor. Secretary.
FRANCIS W. GOSS,	Roxbury,	Rec. Secretary.
EDWIN H. BRIGHAM,	Boston,	Librarian.
JAMES B. BREWSTER,	Plymouth,	Orator.
THEODORE F. BRECK,	Springfield,	Anniv. Chairman.

Standing Committees.

Of Arrangements.

O. K. Newell, H. L. Burrell, J. Homans, 2d,
V. Y. Bowditch, R. W. Lovett, J. T. Bowen.

On Publications.

G. C. Shattuck, B. E. Cotting, O. F. Wadsworth.

On Membership and Finances.

F. Minot, B. S. Shaw, J. Stedman,
E. G. Cutler, L. R. Stone.

To Procure Scientific Papers.

H. P. Walcott, E. H. Bradford, L. Wheeler,
C. W. Cooper, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, C. Howe,
F. C. Shattuck, C. G. Carleton.

On Medical Diplomas.

E. J. Forster, F. S. Watson, F. H. Hooper.

Presidents of District Societies—Vice-Presidents (Ex-Officiis).

(Arranged according to Seniority.)

J. H. Gilbert,
J. Seaverns,
J. T. G. Nichols,
W. Dwight,
G. Brown,
G. W. Snow,
A. L. Stickney,
G. W. Gay,
J. C. Gleason,
S. W. Hayes,
H. J. Smith,
H. Colman,
F. W. Chapin,
W. S. Robinson,
F. W. Graves,
S. T. Davis,
C. G. Trow,
W. P. Small.

Councillors.

Barnstable.—Drs. E. E. Hawes, Hyannis; H. S. Kelley, Jr., Dennisport; F. W. Pierce, Marston's Mills.

Berkshire.—Drs. C. W. Burton, Adams; T. Giddings, Housatonic; G. S. Hatch, Pittsfield; J. H. A. Matte, H. J. Millard, North Adams; I. R. Sanford, Sheffield.

Bristol North.—Drs. A. S. Deane, E. F. Galligan, Taunton; J. B. Gerould, North Attleboro'; F. A. Hubbard, S. D. Presbrey, Taunton.

Bristol South.—Drs. W. Butler, Vineyard Haven; D. E. Cone, Fall River; G. L. Ellis, Middleboro'; B. J. Handy, Fall River; A. M. Pierce, W. H. Taylor, E. T. Tucker, New Bedford.

Essex North.—Drs. C. G. Carleton, C. N. Chamberlain, Lawrence; G. C. Clement, Haverhill; J. A. Douglass, Amesbury; F. B. Flanders, Lawrence; F. A. Howe, Newburyport; J. Pierce, Methuen; R. B. Root, Georgetown; L. A. Woodbury, Groveland.

Essex South.—Drs. C. A. Ahearne, Lynn; F. S. Atwood, Salem; C. Burnham, Lynn; D. Coggin, Salem; J. E. Garland, Gloucester; F. E. Hines, A. H. Johnson, *President*, Salem; G. S. Osborne, Peabody; P. L. Sanborn, Marblehead; C. C. Sheldon, F. D. S. Stevens, Lynn; A. M. Tupper, Rockport.

Franklin.—Drs. A. C. Deane, Greenfield; C. C. Messer, Turner's Falls; R. C. Ward, Northfield.

HAMPDEN.—Drs. W. H. Andrews, T. F. Breck, Springfield; G. Dresser, Chicopee; G. E. Fuller, Monson; F. Holyoke, Holyoke; W. M. E. Mellen, Chicopee; A. O. Squire, Indian Orchard; S. M. Wilbur, Springfield.

HAMPSHIRE.—Drs. C. M. Barton, Hatfield; E. H. Guild, Ware; C. B. King, G. F. Thomson, Belchertown; B. D. Sheedy, Northampton.

MIDDLESEX EAST.—Drs. J. M. Harlow, Woburn; C. C. Odlin, Melrose; P. Sheldon, Wakefield; W. F. Stevens, Stoneham.

MIDDLESEX NORTH.—Drs. F. W. Chadbourne, J. J. Colton, Lowell; N. B. Edwards, North Chelmsford; C. I. Fisher, Tewksbury; J. H. Gilman, Lowell; W. F. Heald, Pepperell; H. P. Jefferson, W. H. Lathrop, A. W. Lavigne, C. A. Savory, Lowell.

MIDDLESEX SOUTH.—Drs. Z. B. Adams, Framingham; S. W. Driver, Cambridge; T. M. Durell, Somerville; J. B. Everett, Everett; D. M. Edgerly, Cambridgeport; E. Farnham, Cambridge; E. J. Forster, Charlestown; W. H. Hildreth, Newton Upper Falls; R. L. Hodgdon, Arlington; H. Holmes, Lexington; A. F. Holt, Cambridgeport; E. G. Hoitt, Marlboro'; A. Hosmer, Watertown; M. A. Morris, Charlestown; G. A. Oviatt, South Sudbury; F. E. Porter, Auburndale; C. E. Spring, Holliston; L. R. Stone, Newton; J. L. Sullivan, Malden; G. J. Townsend, South Natick; H. P. Walcott, Cambridge; A. C. Webber, W. W. Wellington, Cambridgeport; J. W. Willis, Waltham; M. Wyman, Cambridge.

NORFOLK.—Drs. W. P. Bolles, Roxbury; H. W. Broughton, Jamaica Plain; W. Channing, Brookline; B. E. Cotting, Roxbury; B. Cushing, Dorchester; E. F. Dunbar, Roxbury; H. C. Ernst, Jamaica Plain; W. S. Everett, Hyde Park; W. C. B. Fifield, Dorchester; J. A. Finn, Roxbury; D. S. Fogg, Norwood; E. P. Gerry, Jamaica Plain; D. D. Gilbert, Dorchester; A. H. Hodgdon, Dedham; H. P. Jaques, Milton; A. D. Kingsbury, Needham; C. E. Stedman, Dorchester; H. R. Stedman, Roslindale; C. F. Withington, Roxbury.

NORFOLK SOUTH.—Drs. S. M. Donovan, Quincy; J. C. Fraser, East Weymouth; G. W. Tinkham, Weymouth.

PLYMOUTH.—Drs. J. H. Averill, Campello; H. F. Borden, Brockton; J. B. Brewster, Plymouth; H. W. Dudley, Abington; A. E. Paine, Brockton; F. G. Wheatley, North Abington.

SUFFOLK.—Drs. S. L. Abbot, H. J. Barnes, C. J. Blake, H. I. Bowditch, E. H. Bradford, E. H. Brigham, *Librarian*, F. E. Bundy, J. F. Bush, A. T. Cabot, Boston; B. F. Campbell, East Boston; J. R. Chadwick, D. W. Cheever, J. W. Cushing, O. W. Doe, F. W. Draper, *Treasurer*, S. H. Durgin, Boston; T. W. Fisher, South Boston; R. H. Fitz, C. F. Folsom, Boston; M. F. Gavin, South Boston; G. W. Gay, C. M. Green, J. O. Green, F. B. Greenough, W. H. H. Hastings, W. C. Holyoke, J. Homans, W. Ingalls, B. J. Jeffries, G. F. Jelly, F. I. Knight, G. H. Lyman, A. L. Mason, A. E. McDonald, F. Minot, C. B. Porter, A. Post, J. P. Reynolds, W. L. Richardson, T. M. Rotch, G. B. Shattuck, G. C. Shattuck, B. S. Shaw, A. D. Sinclair, A. M. Sumner, C. W. Swan, *Corresponding Secretary*, G. G. Tarbell, O. F. Wadsworth, J. C. Warren, Boston; A. P. Weeks, Chelsea; J. C. White, E. N. Whittier, E. Wigglesworth, H. W. Williams, Boston.

WORCESTER.—Drs. M. Bemis, Worcester; A. G. Blodgett, West Brookfield; G. Brown, Barre; W. Davis, G. E. Francis, T. H. Gage, Worcester; E. B. Harvey, Westboro'; H. A. Jewett, Northboro'; W. H. Lincoln, Millbury; J. O. Marble, Worcester; G. M. Morse, Clinton; W. E. Rice, North Grafton; G. C. Webber, Millbury; E. Warner, L. Wheeler, A. Wood, Worcester.

WORCESTER NORTH.—Drs. R. F. Andrews, Gardner; G. D. Colony, *Vice-President*, Fitchburg; J. R. Greenleaf, Gardner; B. H. Hartwell, Ayer; G. Jewett, Fitchburg.

Censors.

BARNSTABLE.—Drs. T. R. Clement, Osterville; G. W. Doane, Hyannis; R. H. Faunce, Sandwich; B. D. Gifford, Chatham; G. N. Munsell, Harwich.

BERKSHIRE.—Drs. J. F. A. Adams, Pittsfield; O. J. Brown, North Adams; W. W. Leavitt, Pittsfield; E. E. Mather, Williamstown; A. T. Wakefield, Sheffield.

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Bristol North.—Drs. H. B. Baker, South Dighton; O. Copp, W. Y. Fox, M. Perry, Taunton; A. M. Round, Norton.

Bristol South.—Drs. A. B. Cushman, South Dartmouth; W. A. Dolan, W. T. Learned, Fall River; F. M. Sherman, New Bedford; E. M. Whitney, Fair Haven.

Essex South.—Drs. J. F. Croston, C. E. Durant, Haverhill; E. P. Hurd, Newburyport; F. W. Kennedy, Lawrence; J. F. Young, Newburyport.

Essex South.—Drs. H. K. Foster, Peabody; C. W. Galloupe, Lynn; C. W. Haddock, Beverly; H. W. Newell, Lynn; E. L. Peirson, Salem.

Franklin.—Drs. E. G. Best, Turner's Falls; C. Bowker, Bernardston; F. J. Canedy, Shelburne Falls; J. H. Goddard, Orange; G. P. Twitchell, Greenfield.

Hampden.—Drs. W. H. Chapin, Springfield; F. Holyoke, Holyoke; W. H. Pomeroy, P. A. Sprague, G. L. Woods, Springfield.

Hampshire.—Drs. C. W. Cooper, C. R. Gardner, A. H. Hoadley, Northampton; H. H. Seelye, Amherst; G. D. Thayer, Northampton.

Middlesex East.—Drs. J. P. Bixby, North Woburn; H. G. Blake, Woburn; W. S. Brown, Stoneham; M. A. Cummings, Winchester; E. S. Jack, Melrose.

Middlesex North.—Drs. B. R. Benner, G. J. Bradt, W. A. Johnson, J. J. McCarty, Lowell; A. Howard, Chelmsford.

Middlesex South.—Drs. C. K. Cutter, Charlestown; O. H. Marion, Allston; W. D. Swan, Cambridge; F. W. Taylor, North Cambridge; A. Worcester, Waltham.

Norfolk.—Drs. A. B. Coffin, H. L. Harrington, Dorchester; A. P. Perry, Jamaica Plain; I. W. Starbird, J. A. Tanner, Dorchester.

Norfolk South.—Drs. S. C. Bridgham, South Braintree; C. A. Dorr, South Hingham; W. A. Drake, North Weymouth; O. H. Howe, Cohasset; E. N. Mayberry, South Weymouth.

Plymouth.—Drs. J. E. Bacon, Brockton; N. C. King, Campello; E. P. Linfield, Avon; A. V. Lyon, Brockton; A. A. MacKeen, Whitman.

SUFFOLK.—Drs. H. L. Burrell, F. H. Davenport, G. M. Garland, J. H. McCollom, H. F. Vickery, Boston.

WORCESTER.—Drs. F. E. Corey, Westboro'; H. S. Knight, W. T. Souther, W. C. Stevens, Worcester; G. C. Webber, Millbury.

WORCESTER NORTH.—Drs. C. H. Bailey, South Gardner; C. E. Bigelow, E. J. Cutter, Leominster; E. L. Fiske, Fitchburg; G. B. Underwood, West Gardner.

Commissioners of Trials.

BARNSTABLE	J. E. Pratt	Sandwich.
BERKSHIRE	F. K. Paddock	Pittsfield.
BRISTOL NORTH	C. Howe	Taunton.
BRISTOL SOUTH	H. S. B. Smith	Middleboro'.
ESSEX NORTH	F. A. Howe	Newburyport.
ESSEX SOUTH	I. F. Galloupe	Lynn.
FRANKLIN	J. B. Laidley	Conway.
HAMPDEN	S. D. Brooks	Springfield.
HAMPSHIRE	J. Yale	Ware.
MIDDLESEX EAST	S. W. Abbott	Wakefield.
MIDDLESEX NORTH	J. C. Irish	Lowell.
MIDDLESEX SOUTH	G. C. Pierce	Ashland.
NORFOLK	J. W. Chase	Dedham.
NORFOLK SOUTH	J. A. Gordon	Quincy.
PLYMOUTH	H. F. Borden	Brockton.
SUFFOLK	C. W. Swan	Boston.
WORCESTER	J. Wilmarth	Milford.
WORCESTER NORTH	J. M. Blood	Ashby.

Officers of the District Medical Societies.

BARNSTABLE.—Dr. S. T. Davis, Orleans, *President;* Dr. S. Pitcher, Hyannis, *Vice-President;* Dr. F. A. Rogers, Brewster, *Secretary;* Dr. C. M. Hulbert, South Dennis, *Treasurer.*

BERKSHIRE.—Dr. W. P. Small, Great Barrington, *President;* Dr. H. Bushnell, North Adams, *Vice-President;* Dr. H. Colt, Pittsfield, *Secretary;* Dr. W. L. Paddock, Pittsfield, *Treasurer;* Dr. W. W. Leavitt, Pittsfield, *Librarian.*

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Bristol North.—Dr. W. S. Robinson, Taunton, *President;* Dr. F. A. Hubbard, Taunton, *Vice-President;* Dr. W. Y. Fox, Taunton, *Secretary;* Dr. J. B. Murphy, Taunton, *Treasurer;* Dr. M. Perry, Taunton, *Librarian.*

Bristol South.—Dr. S. W. Hayes, New Bedford, *President;* Dr. J. H. Jackson, Fall River, *Vice-President;* Dr. A. J. Abbé, Fall River, *Secretary, Treasurer and Librarian.*

Essex North.—Dr. G. W. Snow, Newburyport, *President;* Dr. R. C. Huse, Georgetown, *Vice-President;* Dr. M. D. Clarke, Haverhill, *Secretary and Treasurer.*

Essex South.—Dr. H. Colman, Lynn, *President;* Dr. S. W. Torrey, Beverly, *Vice-President;* Dr. G. Z. Goodell, Salem, *Secretary;* Dr. T. L. Perkins, Salem, *Treasurer;* Dr. F. Thompson, Salem, *Librarian.*

Franklin.—Dr. C. G. Trow, Sunderland, *President;* Dr. W. H. Pierce, Bernardston, *Vice-President;* Dr. F. H. Zabriskie, Greenfield, *Secretary and Treasurer.*

Hampden.—Dr. F. W. Chapin, Springfield, *President;* G. W. Davis, Holyoke, *Vice-President;* Dr. J. T. Herrick, Springfield, *Secretary, Treasurer and Librarian.*

Hampshire.—Dr. W. Dwight, North Amherst, *President;* Dr. T. Gilfillan, Northampton, *Vice-President;* Dr. A. H. Hoadley, Northampton, *Secretary;* Dr. C. W. Cooper, Northampton, *Treasurer;* Dr. G. D. Thayer, Northampton, *Librarian.*

Middlesex East.—Dr. F. W. Graves, Woburn, *President;* Dr. J. S. Clark, Melrose, *Vice-President;* Dr. D. March, Jr., Winchester, *Secretary;* Dr. J. O. Dow, Reading, *Treasurer.*

Middlesex North.—Dr. H. J. Smith, Lowell, *President;* Dr. C. M. Fisk, Lowell, *Vice-President;* Dr. W. G. Eaton, Lowell, *Secretary;* Dr. W. B. Jackson, Lowell, *Treasurer;* Dr. C. A. Viles, Lowell, *Librarian.*

Middlesex South.—Dr. J. T. G. Nichols, Cambridge, *President;* Dr. E. R. Cutler, Waltham, *Vice-President;* Dr. J. A. Mead, Watertown, *Secretary;* Dr. W. Ela, Cambridge, *Treasurer;* Dr. S. E. Wyman, Cambridge, *Librarian.*

Norfolk.—Dr. J. Seaverns, Roxbury, *President;* Dr. J. S.

Greene, Dorchester, *Vice-President;* Dr. J. C. D. Pigeon, Roxbury, *Secretary and Librarian;* Dr. E. G. Morse, Roxbury, *Treasurer.*

NORFOLK SOUTH.—Dr. J. H. Gilbert, Quincy, *President;* Dr. J. W. Spooner, Hingham, *Vice-President;* Dr. J. F. Welch, Quincy, *Secretary and Treasurer;* Dr. S. C. Bridgham, South Braintree, *Librarian.*

PLYMOUTH.—Dr. J. C. Gleason, Rockland, *President;* Dr. A. E. Paine, Brockton, *Vice-President;* Dr. A. V. Lyon, Brockton, *Secretary and Treasurer;* Dr. W. P. Chisholm, Brockton, *Librarian.*

SUFFOLK.—Dr. G. W. Gay, Boston, *President;* Dr. E. N. Whittier, Boston, *Vice-President;* Dr. J. J. Minot, Boston, *Secretary;* Dr. E. M. Buckingham, Boston, *Treasurer;* Dr. B. J. Jeffries, Boston, *Librarian.*

WORCESTER.—Dr. G. Brown, Barre, *President;* Dr. G. E. Francis, Worcester, *Vice-President;* Dr. G. O. Ward, Worcester, *Secretary;* Dr. S. B. Woodward, Worcester, *Treasurer;* Dr. A. C. Getchell, Worcester, *Librarian.*

WORCESTER NORTH.—Dr. A. L. Stickney, Ashburnham, *President;* Dr. F. W. Russell, Winchendon, *Vice-President;* Dr. E. J. Cutter, Leominster, *Secretary;* Dr. G. Jewett, Fitchburg, *Treasurer;* Dr. A. W. Sidney, Fitchburg, *Librarian.*

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Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

October 1, 1890.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 1, 1890, at 11 o'clock, A.M.

The President, Dr. Amos H. Johnson, in the chair.

The following Councillors were present:

Bristol North.
J. B. Gerould,
F. A. Hubbard.

Bristol South.
A. M. Pierce.

Essex North.
C. G. Carleton,
G. C. Clement.

Essex South.
C. A. Ahearne,
D. Coggin,
A. H. Johnson.

Middlesex East.
J. M. Harlow,
C. C. Odlin.

Middlesex North.
J. J. Colton.

Middlesex South.
T. M. Durell,
J. B. Everett,
E. Farnham,
E. J. Forster,
R. L. Hodgdon,
H. Holmes,
E. G. Hoitt,
F. E. Porter,
L. R. Stone,
H. P. Walcott,
A. C. Webber,
W. W. Wellington,
J. W. Willis,
M. Wyman.

Norfolk.
W. P. Bolles,
H. W. Broughton,
W. Channing,
B. E. Cotting,
E. F. Dunbar,
D. S. Fogg,
E. P. Gerry,
D. D. Gilbert,
A. H. Hodgdon,
A. D. Kingsbury,
C. E. Stedman,
H. R. Stedman.

Norfolk South.
G. W. Tinkham.

Plymouth.
J. B. Brewster,
H. W. Dudley,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
H. J. Barnes,
E. H. Bradford,
E. H. Brigham,
F. E. Bundy,
J. F. Bush,
J. R. Chadwick,
D. W. Cheever,
J. W. Cushing,
F. W. Draper,
C. F. Folsom,
M. F. Gavin,
G. W. Gay,

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C. M. Green,	C. B. Porter,	*Worcester.*
F. B. Greenough,	A. Post,	M. Bemis,
W. H. H. Hastings,	W. L. Richardson,	G. E. Francis,
W. C. Holyoke,	T. M. Rotch,	W. H. Lincoln,
J. Homans,	G. B. Shattuck,	J. O. Marble,
W. Ingalls,	A. D. Sinclair,	W. E. Rice.
B. J. Jeffries,	C. W. Swan,	
F. I. Knight,	J. C. Warren,	*Worcester North.*
A. L. Mason,	E. N. Whittier,	B. H. Hartwell.
A. E. McDonald,	H. W. Williams.	
F. Minot,		Total, 81.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—Drs. J. F. A. Adams, of Pittsfield; D. March, Jr. of Winchester.

New York.—Drs. S. D. Presbrey, of Taunton; Morton Prince, of Boston.

New York State Medical Association.—Drs. L. R. Stone, of Newton; R. H. Fitz, of Boston.

The Committee on Membership and Finances reported through Dr. Minot. In accordance with their recommendation the following were allowed to resign:

E. E. Atkins, of Colorado Springs, Col.
C. E. V. Kennon, of Providence, R. I.
F. H. Kelley, of Worcester.
M. A. Warriner, of Bridgeport, Conn.

Also the following were allowed to retire:

O. D. Abbott, of Manchester, N. H.
C. C. Hayes, of Hyde Park.
Edward Newhall, of Lynn.
C. A. Savory, of Lowell.

The Committee on Publications reported through Dr. Shattuck, that a frequent cause of delay in the printing of the Society's "Medical Communications" arises from the want of promptness of some of the readers at the Annual Meetings in furnishing to the Secretary the manuscript of their papers.

The Committee recommended and the Councillors voted,

That every reader of a paper at the Annual Meetings of the Society be expected to hand in a copy of the same to the Recording Secretary as soon as it has been read, and in case of its non-reception within ten days after said meeting it shall be considered that the reader declines to submit it with a view to its publication by the Society.

Adjourned at 11.30, A.M.

FRANCIS W. GOSS,
Recording Secretary.

FEBRUARY 4, 1891.

A STATED MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 4, 1891, at 11 o'clock, A.M.

The President, Dr. AMOS H. JOHNSON, in the chair.

The following Councillors were present:

Barnstable.
H. S. Kelley, Jr.
F. W. Pierce.

Bristol South.
W. Butler.

Essex North.
C. G. Carleton,
G. C. Clement,
R. B. Root.

Essex South.
C. A. Ahearne,
C. Burnham,
A. H. Johnson,
C. C. Sheldon,
F. D. S. Stevens,
A. M. Tupper.

Hampden.
F. Holyoke.

Middlesex East.
J. M. Harlow,
P. Sheldon.

Middlesex North.
N. B. Edwards,
W. H. Lathrop.

Middlesex South.
Z. B. Adams,
T. M. Durell,
J. B. Everett,
E. Farnham,
E. J. Forster,
W. H. Hildreth,
R. L. Hodgdon,
H. Holmes,
E. G. Hoitt,
G. A. Oviatt,
L. R. Stone,
J. L. Sullivan,
H. P. Walcott,
A. C. Webber,
J. W. Willis,
M. Wyman.

Norfolk.
H. W. Broughton,
W. Channing,
B. E. Cotting,
E. F. Dunbar,
H. C. Ernst,
E. P. Gerry,
D. D. Gilbert,
H. P. Jaques,
H. R. Stedman,
C. F. Withington.

Plymouth.
H. F. Borden,
H. W. Dudley,
A. E. Paine,
F. G. Wheatley

Suffolk.
S. L. Abbot,
H. J. Barnes,
E. H. Bradford,
E. H. Brigham,
J. F. Bush,
A. T. Cabot,
B. F. Campbell,
J. R. Chadwick,
D. W. Cheever,
J. W. Cushing,
F. W. Draper,
T. W. Fisher,
C. F. Folsom,
G. W. Gay,
C. M. Green,
J. O. Green,
F. B. Greenough,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
F. Minot,
C. B. Porter,
A. Post,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
B. S. Shaw,
A. D. Sinclair,
G. G. Tarbell,
A. P. Weeks,
E. N. Whittier,
E. Wigglesworth,
H. W. Williams.

Worcester.
G. E. Francis,
T. H. Gage,
E. B. Harvey,
H. A. Jewett,
W. H. Lincoln,
J. O. Marble,
G. M. Morse,
G. C. Webber.

Worcester North.
R. F. Andrews,
G. D. Colony,
B. H. Hartwell,
Total, 95.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. C. G. Carleton, of Lawrence; F. H. Williams, of Boston.

New Hampshire.—Drs. S. B. Woodward, of Worcester; E. J. Cutter, of Leominster.

Rhode Island.—Drs. F. A. Howe, of Newburyport; F. S. Atwood, of Salem.

Connecticut.—Drs. F. H. Brown, of Boston; A. T. Cabot, of Boston.

New Jersey.—Drs. A. H. Nichols, of Boston; F. W. Chapin, of Springfield.

The following Committees were appointed:

To Audit the Treasurer's Accounts.—Drs. S. W. Driver, J. H. McCollom.

To Examine the By-Laws of District Societies.—Drs. S. D. Presbrey, J. C. White, F. W. Chapin.

The Committee on Membership and Finances reported

through Dr. Minot. In accordance with their recommendation the following were allowed to resign:

H. F. Adams, of Longmont, Col.
J. L. Foley, of Montreal, Can.
R. A. Greene, of Manchester, N. H.
H. S. Johnson, of Lawrenceville, N. J.
I. R. Sanford, of Sheffield.

Also the following were allowed to retire:

W. H. Lincoln, of Millbury.
R. W. Newell, of Boston.

Also the following were dropped from the roll for five years' delinquency in assessments:

L. E. Allen, of Arlington.
M. J. Davis, of New York, N. Y.
C. L. Edwards, of Hyde Park.
L. H. Luce, of West Tisbury.
F. E. Rice, of Cambridge.
John Smithwick, of Sharon.

Also the following, having forfeited membership by removal from the State and non-payment of assessments, was dropped from the roll:

Augustus Stabler, of Brighton, Md.

The Chair announced that to fill the vacancy in the Committee on the Distribution of Diseases, caused by the death of Dr. W. Everett Smith, he had appointed Dr. S. W. Abbott, of Wakefield, to co-operate with Prof. Shaler and General Greely. The appointment of Dr. Abbott was confirmed.

Adjourned at 12, noon.

FRANCIS W. GOSS,
Recording Secretary.

June 9, 1891.

The Annual Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 9, 1891, at 11 o'clock, A.M.

The President, Dr. Amos H. Johnson, in the chair.

The following Councillors were present:

Barnstable.
R. H. Faunce,
B. D. Gifford,
F. A. Rogers.

Berkshire.
O. J. Brown.

Bristol North.
J. P. Brown,
A. S. Deane.

Bristol South.
D. E. Cone.

Essex North.
C. G. Carleton,
G. C. Clement,
F. A. Howe.

Essex South.
J. Allen,
C. Burnham,
H. J. Gaffney,
M. A. Jewett,
A. H. Johnson,
E. A. Kemp,
F. D. S. Stevens.

Hampshire.
J. Yale.

Middlesex East.
A. H. Cowdrey,
F. W. Graves,
J. M. Harlow,
S. W. Kelley.

Middlesex North.
H. R. Brissett,
W. B. Jackson,
A. C. Lane,
W. H. Lathrop,
C. P. Spalding.

Middlesex South.
Z. B. Adams,
W. A. Bell,
C. H. Cook,
T. M. Durell,
D. M. Edgerly,
W. Ela,
E. Farnham,
E. J. Forster,
J. L. Harriman,
W. H. Hildreth,
R. L. Hodgdon,
E. G. Hoitt,
H. Holmes,
J. A. Mead,
G. A. Oviatt,
L. R. Stone,
G. E. Titcomb,
G. J. Townsend,
C. E. Vaughan,
H. P. Walcott,
J. W. Willis.

Norfolk.
W. Channing,
B. E. Cotting,
E. F. Dunbar,
W. S. Everett,
J. A. Finn,
D. S. Fogg,
D. D. Gilbert,
A. H. Hodgdon,
E. C. Norton,
C. E. Stedman,
J. A. Tanner,
J. A. Winkler.

Plymouth.
J. H. Averill,
H. F. Borden,
E. A. Chase,
H. W. Dudley,
F. J. Ripley,
F. G. Wheatley.

Suffolk.
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
E. Bundy,
J. F. Bush,
B. F. Campbell,
D. W. Cheever,
J. W. Cushing,
E. G. Cutler,
F. W. Draper,
T. W. Fisher,
R. H. Fitz,
C. F. Folsom,

C. M. Green,
W. H. H. Hastings,
W. C. Holyoke,
W. Ingalls,
B. J. Jeffries,
C. M. Jones,
F. I. Knight,
J. H. McCollom,
A. E. McDonald,
F. Minot,
A. B. Morong,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
G. C. Shattuck,
A. D. Sinclair,
G. G. Tarbell,
J. C. Warren,
J. C. White.

Worcester.

M. Bemis,
W. Davis,
G. E. Francis,
T. H. Gage,
E. B. Harvey,
W. H. Lincoln,
W. E. Rice,
L. Wheeler.

Worcester North.

R. F. Andrews,
L. W. Baker,
J. M. Blood,
L. G. Chandler.

Total, 111.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Draper, read his annual report.

The Auditing Committee reported that they found the accounts properly vouched and correctly cast.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Minot and recommended that one-half of the surplus in the treasury, amounting to $1362.53, be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation by the same Committee it was voted that the following be allowed to resign:

C. L. Blakeslee, of Westfield.
C. D. Brewer, of Springfield.
D. G. Hall, of Dallas, Texas.
J. H. Kingman, of Pawtucket, R. I.
C. P. Pinckard, of Chicago, Ill.
A. V. Snow, of Brookfield.
M. F. Trevino, of Mexico, Mex.

Also that the following be allowed to retire:

H. G. Clark, of Dorchester.
Lemuel Dickerman, of Foxboro'.

D. S. Fogg, of Norwood.
S. S. Gifford, of Avon.
F. A. Jewett, of Grafton.
V. L. Owen, of Springfield.

Also that the following be restored to membership:

George Lewis Perry, of Williamsburg.

The Committee on Publications presented their report.

The Committee on the By-Laws of the District Societies made their report.

The Librarian, Dr. Brigham, made his annual report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	Dr. AMOS H. JOHNSON, of Salem.
Vice-President .	Dr. JAN J. B. VERMYNE, of New Bedford.
Treasurer . .	Dr. FRANK W. DRAPER, of Boston.
Corresponding Sec'y	Dr. CHARLES W. SWAN, of Boston.
Recording Secretary	Dr. FRANCIS W. GOSS, of Roxbury.
Librarian . .	Dr. EDWIN H. BRIGHAM, of Boston.

Dr. FRANK W. DRAPER, of Boston, was chosen Orator, and

Dr. EDWARD H. BRADFORD, of Boston, Anniversary Chairman, for the Annual Meeting of the Society in 1892.

Voted,—That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1892.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

R. W. Lovett, J. T. Bowen, H. Jackson,
J. Homans, 2d, F. M. Briggs, J. C. Munro.

On Publications.

G. C. Shattuck, B. E. Cotting, O. F. Wadsworth.

On Membership and Finances.

F. Minot, B. S. Shaw, J. Stedman,
E. G. Cutler, L. R. Stone.

To Procure Scientific Papers.

H. P. Walcott, E. H. Bradford, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, F. C. Shattuck,
C. G. Carleton, E. Cowles.

On Medical Diplomas.

E. J. Forster, F. H. Hooper, H. E. Marion.

The appointment of Delegates by the President to the International Medical Congress of Hygiene and Demography was confirmed as follows:

Drs. G. H. Lyman, H. J. Barnes, of Boston; S. W. Abbott, of Wakefield.

The following additional Delegates to the Centennial Anniversary of the New Hampshire Medical Society were appointed:

Drs. A. H. Johnson, of Salem; D. W. Cheever, G. W. Gay, F. W. Draper, J. C. Warren, F. W. Goss, of Boston; T. H. Breck, of Springfield; E. B. Harvey, of Westboro'; J. C. Hildreth, of Cambridge.

Adjourned at 12.05, P.M.

FRANCIS W. GOSS,
Recording Secretary.

XUM

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

Sectional meetings of the Society were held in the Building of the Massachusetts Charitable Mechanic Association, Boston, on Tuesday, June 9, 1891, at 2 o'clock, P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. A. H. Johnson, of Salem . . . . . Chairman.
Dr. Henry Jackson, of Boston . . . . Secretary.

Typhoid Fever.—By Dr. W. H. Pierce, of Bernardston. Discussion by Drs. E. N. Whittier, C. C. Odlin, J. A. Gage.

The Bacillus of Typhoid Fever: its Occurrence and Significance.—By Dr. J. A. Jeffries, of Boston.

The Prodromal and Early Symptoms of Bright's Disease.—By Dr. C. F. Withington, of Roxbury. Discussion by Drs. G. B. Shattuck, E. G. Cutler.

SECTION IN SURGERY.

Dr. J. C. Warren, of Boston . . . . . Chairman.
Dr. M. D. Clarke, of Haverhill . . . . Secretary.

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THE DIAGNOSIS AND TREATMENT OF INFLAMMATIONS OF THE APPENDIX.—A Discussion by Drs. J. C. Warren, D. W. Cheever, R. H. Fitz, John Homans, C. B. Porter, Alfred Worcester, J. W. Elliot, F. C. Shattuck, S. H. Weeks, S. C. Gordon, H. O. Marcy, J. C. Irish, G. W. Gay, W. F. Whitney.

SECTION IN OBSTETRICS AND GYNECOLOGY.

Dr. G. E. FRANCIS, of Worcester . . . . Chairman.
Dr. GEORGE HAVEN, of Boston . . . . Secretary.

MODERATELY CONTRACTED PELVES.—By Dr. R. W. Greene, of Worcester. Discussion by Drs. E. Reynolds, L. Wheeler, C. M. Green.

PESSARIES, THEIR USE AND ABUSE.—A Discussion by Drs. C. M. Green, E. Reynolds, of Boston; L. Wheeler, of Worcester; W. M. Mercer, of Pittsfield.

A CASE OF TRIPLETS.—By Dr. H. F. Vickery, of Boston.

At 8 o'clock, P.M., the Shattuck Lecture was given by Dr. EDWARD COWLES, of Somerville.

FRANCIS W. GOSS,
Recording Secretary.

SECOND DAY.

THE Society met in Mechanics Building, Boston, on Wednesday, June 10, 1891, at 9 o'clock, A.M., for the exercises of the one hundred and tenth Anniversary.

The President, Dr. AMOS H. JOHNSON, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary read the names of Fellows admitted since the last annual meeting, and of Fellows whose deaths had been reported.

Fellows admitted since June 10, 1890.

1890	Abbé, Edward Hooper - - -	New Bedford.
1891	Achorn, John Warren - - -	Boston.

1891	Adams, Walter Henry	Quincy.
1890	Ames, John Lincoln	Boston.
1891	Arnold, Horace David	Boston.
1890	Baird, Julian William	Boston.
1890	Bartol, John Washburn	Boston.
1891	Bancroft, George Andrew	Taunton.
1891	Belden, Albert Matson	Chesterfield.
1890	Blake, John Bapst	Boston.
1891	Bolton, Charles James	Boston.
1891	Bond, Sarah Adams	East Boston.
1890	Bragdon, Horace Elwood	Boston.
1890	Brooks, William Allen, Jr.	Boston.
1891	Bryant, Edward Gilman	Roxbury.
1890	Crafts, Leo Melville	Boston.
1891	Cram, John Wesley	Colrain.
1890	Carroll, William Edward	Taunton.
1890	Chalifaux, Joseph Herménégilde	Haverhill.
1891	Chapin, Delia Lucretia	Springfield.
1891	Cheney, William Elisha	Boston.
1891	Clancy, William Henry	East Cambridge.
1891	Codding, Edwin Harden	Mansfield.
1890	Coolidge, Frederic Shurtleff	Boston.
1891	Crockett, Eugene Anthony	Boston.
1891	Cronin, Joseph John	Roxbury.
1890	Currier, William Hale	Pittsfield.
1890	Curtis, Henry Fuller	South Boston.
1890	Darrah, Rufus Elmer	Boston.
1890	Dehu, Edward William	New Bedford.
1890	Dodge, George Smith	Woburn.
1890	Dudley, James Willard	Boston.
1891	Duff, John	Charlestown.
1890	Dwight, Edwin Wells	Boston.
1890	Dwyer, John Edward	Lowell.
1891	Dunham, Whitfield Otis	Haverhill.
1891	Fallon, Michael Francis	Worcester.
1891	Fillebrown, Charles Dalton	Roxbury.
1890	Finn, Edward William	Roxbury.
1891	Fitz, George Wells	Boston.
1890	Fourtin, Edmund Randolph Peaslee	Tewksbury.
1890	Fuller, Daniel Hunt	Boston.
1891	Gale, George Washington	East Saugus.
1890	Goodman, Samuel	Boston.
1890	Grady, Joseph William	Lowell.
1891	Gray, George Henry	Lynn.
1890	Hall, Harry Ward	Spokane Falls, Wash.
1890	Hicks, Joseph	Boston.
1890	Hitchcock, Henry Russell	Hyde Park.

1890	Hobbie, John Remington	North Adams.
1891	Horgan, John Augustus	Roxbury.
1890	Holmes, Charles Moses	Northampton.
1890	Hunt, Allston Frost	Swampscott.
1891	Hurd, George Platt	East Cambridge.
1891	Hutchins, Joseph Henry	Boston.
1891	Jackson, James Marsh	Boston.
1890	Jelly, Arthur Carlton	Boston.
1891	Johnson, Stephen Joseph	Lowell.
1890	Jones, Charles David	Malden.
1891	Jones, Elgin Wilbur	Lynn.
1891	Judkins, Frank Luville	Lynn.
1890	Kaan, George Warton	Boston.
1891	Kilroy, Philip	Springfield.
1891	King, William Rufus	Lynn.
1891	Lancaster, Walter Brackett	Wellesley Hills.
1890	LaBreche Smith, George	Northampton.
1890	Lothrop, Howard Augustus	Boston.
1891	McGauran, Michæl Sheridan	Lawrence.
1890	McMillan, Andrew Louis	Hanover.
1891	Mignault, Armand	Lowell.
1891	Miner, Worthington W	Ware.
1890	Moroney, William Joseph	Boston.
1890	Morse, John Lovett	Boston.
1891	Moulton, Charles Fred	West Roxbury.
1890	Nason, Laurentius Melancthon	Worcester.
1890	Nichols, Edward Hall	Boston.
1891	Noyes, William	Somerville.
1891	O'Hearn, William Henry	Lawrence.
1891	O'Meara, Michael John	Worcester.
1890	Padula, Thomas Francis	Dorchester.
1890	Park, Francis Edwin, Jr.	Stoneham.
1890	Parks, John Wilson	East Boston.
1890	Partridge, Charles Catlin	Hyde Park.
1891	Pearson, Maurice Wellesley	Worcester.
1890	Peirce, Amos Hagar	West Newbury.
1891	Penniman, Anson Warren	Boston.
1891	Perry, Herbert Brainard	Amherst.
1890	Plummer, Edward Maverick	Charlestown.
1891	Plummer, Henry Lincoln	East Boston.
1890	Preston, Grace Alma	Northampton.
1891	Proctor, Francis Ingersoll	Boston.
1890	Quackenboss, Alexander	Boston.
1891	Ray, John Edward	Roxbury.
1891	Richardson, Anna Gove	East Boston.
1891	Richardson, William Shedd	Marlboro'.
1891	Robinson, Edward Olin	Springfield.

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1890	Robinson, Thomas Johns	Boston.
1890	Rogers, Albert Edward	Dorchester.
1890	Rolfe, William Alfred	Boston.
1891	Shatswell, James Arthur	Middleton.
1891	Sheedy, William Clinton	New Bedford.
1891	Sheridan, Oliver Michael	Randolph.
1890	Simpson, James Edwin	Salem.
1890	Slayter, John Theodore Harding	Cambridgeport.
1890	Smith, Belle Hamilton	So. Framingham.
1891	Stevens, Henry Lawrence	New Bedford.
1891	Stiles, Fred Merritt	Waltham.
1890	Swan, Will Howard	Boston.
1890	Swift, Lawrence Chew	Pittsfield.
1890	Thayer, William Sydney	Baltimore.
1890	Thompson, John McQuaid	Boston.
1891	Van Pelt, Gertrude Wyckoff	Boston.
1890	Weeks, Joshua Franklin	New Bedford.
1891	Wentworth, Arthur Howard	Boston.
1891	Whitten, George Edwin	North Adams.
1890	Williams, Sara Jane	Lowell.
1890	Winslow, Kenelm	Waltham.
	Total,	117.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1880	*Barker, Fordyce	New York, N. Y.	May 30, 1891	73
1840	Batchelder, Daniel Homer	Danvers	Sept. 4, 1890	79
1844	Bigelow, Henry Jacob	Boston	Oct. 30, 1890	72
1853	Borland, John Nelson	New London, Ct.	Aug. 10, 1890	62
1882	Church, Moses David	Cambridge	Aug. 25, 1890	46
1845	Davidson, Herman Elvers	Boston	Aug. 10, 1890	75
1841	DeWolf, Thaddeus Kingsley	Chester Centre	Nov. 4, 1890	89
1869	Doe, Orlando Witherspoon	Boston	Dec. 10, 1890	47
1871	Dow, William Wellman	Somerville	May 8, 1891	57
1889	Eliot, George	Boston	May 22, 1891	25
1865	Gilman, John Henry	Lowell	June 11, 1890	54
1870	Gleason, Jubal Converse	Rockland	Nov. 1, 1890	52
1858	Griggs, Thomas Thurston	Grafton	Aug. 11, 1890	72
1867	Holt, Alfred Fairbanks	Cambridge	Dec. 28, 1890	52
1856	Hosmer, Alfred	Watertown	May 14, 1891	58
1883	Hubbell, Charles Lyman	Williamstown	Oct. 7, 1890	64
1880	Knight, Harvey	Belleview, Fla.	March 26, 1891	46
1859	Livermore, Abel Cutting	Stow	March 15, 1891	66
1866	Lovering, John Dudley	Newton Highl'ds	March 18, 1891	64
1850	Mackie, John Howell	New Bedford	March 5, 1891	65
1859	Murphy, Joseph	Taunton	Sept. 15, 1890	72
1881	Niles, Daniel Waterhouse	Worcester	July 17, 1890	63
1888	Parsons, Ralph Alfred	West Roxbury	April 3, 1891	29
1837	Peck, William Dandridge	Sterling	June 29, 1890	77
1852	Sharp, John Cauldwell	Boston	Sept. 26, 1890	64
1884	Sheldon, Preston	Wakefield	April 17, 1891	37

1882	Smith, Willard Everett	Boston	July 14, 1890	33
1863	Snow, Jesse Walker	Boston	June 12, 1890	69
1876	Spring, Charles Edward	Holliston	Oct. 25, 1890	48
1873	Stevens, Winthrop Flint	Stoneham	Sept. 5, 1890	42
1847	Streeter, Joseph Herman	Roxbury	May 30, 1891	70
1869	Sullivan, Timothy	Lawrence	March 2, 1890	58
1843	Taylor, Israel Houston	Amherst	Oct. 16, 1890	78
1857	Temple, Theron	Waltham	Sept. 28, 1890	57
1855	Tyler, Warren	North Brookfield	April 18, 1891	72
1879	Warren, Franklin Cooley, Jr.	Boston	Jan. 2, 1891	37
1854	Warren, Joseph Huckins	Boston	March 24, 1891	59
1835	Whitney, Warren Jacob	Dorchester	March 11, 1891	80
1867	Wilmarth, Jerome	Milford	Oct. 7, 1890	58

* Honorary. Total, 39.

The Treasurer, Dr. Draper, presented his annual report.

Dr. W. N. Bullard, of Boston, at the request of a committee from the Clinical Section of the Suffolk District Medical Society, presented the following statement and recommendation:

The time has now arrived when it is absolutely necessary, in the interests of common humanity, that some proper provision should be made for the care and treatment of Chronic Adult Epileptics. The present arrangements, by which such afflicted can only be received into lunatic hospitals or almshouses, are totally inadequate.

It is therefore recommended that a committee of five be appointed by the President of the Massachusetts Medical Society, with powers to prepare a suitable bill, and to have the same presented to the Legislature of the State, and said committee to have the arrangement and direction of such other matters in connection with this subject as may seem to them desirable.

The recommendation was adopted, and the following were appointed to constitute the Committee:

Drs. W. N. Bullard, G. F. Jelly, H. R. Stedman, of Boston; E. P. Elliot, of Danvers: L. W. Baker, of Baldwinsville.

Papers were read as follows:

Catheter Fever.—By Dr. Paul Thorndike, of Boston, Dr. A. T. Cabot made remarks on this paper.

A Case of Nephrectomy for Injury of the Kidney.—By Dr. Homer Gage, of Worcester.

How shall we Nourish in Acute Disease?—By Dr. F. H. Williams, of Boston. Discussion by Drs. J. W. Warren and W. H. Pomeroy.

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Dr. H. O. Marcy, of Boston, showed specimens of kangaroo tendons for suture.

The following delegates from other State Medical Societies were present:

New Hampshire.—Drs. J. W. Staples, W. T. Smith, G. P. Conn, C. P. Bancroft.
Vermont.—Dr. E. M. Brown.
Rhode Island.—Drs. F. L. Day, J. H. Kingman.
Connecticut.—Dr. E. D. Hall.
New York.—Dr. T. S. Dawes.

Drs. Staples, Smith, Conn, Brown, Hall and Dawes responded for their several Societies.

At 12 o'clock the Annual Discourse was delivered by Dr. JAMES B. BREWSTER, of Plymouth.

At the close of the oration a vote of thanks was presented to the orator for his most interesting and valuable discourse.

At 1, P.M., the Annual Dinner, presided over by the Anniversary Chairman, Dr. THEODORE F. BRECK, was served to more than eight hundred Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer respectfully reports as follows concerning the Society's finances for the year ending April 15, 1891:

Receipts from all sources . . .	$12,898 69
Expenses	10,173 63
Balance to new account . . .	$2,725 06

The receipts and disbursements appear in detail in the appended accounts. The Society's invested funds amount to $33,420.17, distributed as follows:

Shattuck Fund . . .	$9,166 87
General Fund	11,253 30
Phillips Fund . . .	10,000 00
Cotting Fund	3,000 00

There has been no change in these funds during the year; they have yielded a revenue of $1,337.99.

Since April 15, 1890, assessment-dues to the amount of $100.00 have been remitted by vote of the Councillors, upon the recommendation of the Committee on Membership and Finances.

By order of the Councillors, also, seven members have been dropped from the Roll of Fellows, in accordance with the By-Laws, on account of unexcused delinquency in the payment of their Society dues.

Fifteen members have resigned their fellowship during the year; and two, who had been dropped, have been restored.

The Society now bears on its Rolls the names of 1733 Fellows.

Respectfully submitted,

F. W. DRAPER,

BOSTON, JUNE 5, 1891. *Treasurer.*

Dr. **F. W. Draper, Treasurer, in account with**

Income.

Balance from last account		$3455 20
Assessments paid to the Treasurer		1610 00
Assessments collected by District Treasurers:—		
Barnstable	95 00	
Berkshire	165 00	
Bristol North	155 00	
Bristol South	250 00	
Essex North	365 00	
Essex South	340 00	
Franklin	105 00	
Hampden	310 00	
Hampshire	155 00	
Middlesex East	135 00	
Middlesex North	400 00	
Middlesex South	810 00	
Norfolk	705 00	
Norfolk South	120 00	
Plymouth	190 00	
Suffolk	1370 00	
Worcester	590 00	
Worcester North	125 00	
		6385 00
Interest Account:—		
General Fund	450 12	
Phillips Fund	400 00	
Shattuck Fund	366 67	
Cotting Fund	121 20	
Interest on cash-balance in Savings Banks	100 50	
		1438 49
Extra Dinner Tickets sold at Annual Meeting, 1890.		10 00
		$12898 69

The Committee appointed to audit the Treasurer's accounts have carefully attended to that duty, and respectfully report that they find the accounts properly vouched and correctly cast.

The balance on hand is $2,725.06.

Securities representing the invested funds have been inspected, and are found to have the face value of $33,420.17.

STEPHEN WM. DRIVER,
J. H. McCOLLOM.

Boston, May 20, 1891.

the Massachusetts Medical Society. Cr.

Expenses.

On account of Annual Meeting, 1890:—		
Caterer	$1756 00	
Cigars	102 00	
Exhibit expenses	89 76	
Flowers	50 00	
Incidentals	61 35	
Music	104 00	
Printing	55 00	
Rent of Mechanics' Building	375 00	
		$2603 11
Committee on Diplomas, for Stationery		1 50
Committee on Publications:—		
Braithwaite's Retrospect	2560 00	
Communications and Transactions, 1890	673 93	
The Shattuck Lecturer	200 00	
Stenographers' services at Annual Meeting	39 00	
Triennial Catalogue	407 49	
		3880 42
Councillors' Orders:—		
Cotting Lunches at Councillors' Meetings	90 00	
Incidentals	4 50	
		94 50
District Societies' Account:—		
Censors-at-large, for advertising, stationery, etc.	40 75	
Censors' fees for examining candidates	249 00	
Dividend for 1890	1397 05	
District Treasurers' fees and expenses	367 97	
		2054 77
Librarian's Expenses:—		
Allowance for Clerk-hire	50 00	
Incidentals	4 20	
Postage and express charges	497 75	
		551 95
Recording Secretary's Expenses:—		
Incidentals	11 38	
Printing and Postage	97 50	
Salary	250 00	
		358 88
Treasurer's Expenses:—		
Incidentals	9 75	
Printing and Postage	68 75	
Salary	400 00	
		478 50
Rent to January 1, 1891		150 00
		10173 63
Balance to new account, April 15, 1891		2725 06
		$12898 69

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Officers of the Massachusetts Medical Society.

1891—1892.

Chosen June 9, 1891.

AMOS H. JOHNSON, . . Salem, . . President.
JAN J. B. VERMYNE, . New Bedford, Vice-President.
FRANK W. DRAPER, . Boston, . . Treasurer.
CHARLES W. SWAN, . Boston, . . Cor. Secretary.
FRANCIS W. GOSS, . . Roxbury, . Rec. Secretary.
EDWIN H. BRIGHAM, . Boston, . . Librarian.

FRANK W. DRAPER, . Boston, . . Orator.
EDW. H. BRADFORD, . Boston, . . Anniv. Chairman.

Standing Committees.

Of Arrangements.

R. W. Lovett, J. T. Bowen, H. Jackson,
J. Homans, 2d, F. M. Briggs, J. C. Munro.

On Publications.

G. C. Shattuck, B. E. Cotting, O. F. Wadsworth.

On Membership and Finances.

F. Minot, B. S. Shaw, J. Stedman,
E. G. Cutler, L. R. Stone.

To Procure Scientific Papers.

H. P. Walcott, E. H. Bradford, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, F. C. Shattuck,
C. G. Carleton, E. Cowles.

On Medical Diplomas.

E. J. Forster, F. H. Hooper, H. E. Marion.

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Presidents of District Societies—Vice-Presidents (Ex-Officiis).

(Arranged according to Seniority.)

J. Seaverns,
J. T. G. Nichols,
G. F. Thomson,
C. C. Tower,
W. W. Eaton,
G. E. Francis,
G. W. Snow,
E. N. Whittier,
S. W. Hayes,
F. W. Russell,
C. M. Fisk,
A. E. Paine,
F. W. Chapin,
H. Bushnell,
J. S. Clark,
S. Pitcher,
F. A. Hubbard,
W. H. Pierce.

Councillors.

Barnstable.—Drs. R. H. Faunce, Sandwich; B. D. Gifford, Chatham; F. A. Rogers, Brewster.

Berkshire.—Drs. O. J. Brown, North Adams; W. M. Mercer, F. K. Paddock, Pittsfield; G. T. Race, West Stockbridge; T. Riley, Adams; L. D. Woodbridge, Williamstown.

Bristol North.—Drs. J. W. Battershall, Attleboro'; J. P. Brown, A. S. Deane, S. D. Presbrey, W. S. Robinson, Taunton.

Bristol South.—Drs. W. Butler, Vineyard Haven; D. E. Cone, B. J. Handy, Fall River; G. De N. Hough, New Bedford; W. T. Learned, Fall River; A. M. Pierce, E. T. Tucker, New Bedford.

Essex North.—Drs. C. G. Carleton, C. N. Chamberlain, Lawrence; G. C. Clement, Haverhill; J. A. Douglass, Amesbury; F. B. Flanders, Lawrence; F. A. Howe, Newburyport; J. Peirce, Methuen; R. B. Root, Georgetown; L. A. Woodbury, Groveland.

Essex South.—Drs. J. Allen, Topsfield; C. Burnham, Lynn; H. K. Foster, Peabody; H. J. Gaffney, Salem; C. W. Galloupe, Lynn; J. E. Garland, Gloucester; C. W. Haddock, Beverly; A. H. Johnson, *President*, Salem; M. A. Jewett, E. A. Kemp, Danvers; J. Kittredge, Marblehead; F. D. S. Stevens, Lynn.

Franklin.—Drs. F. J. Canedy, Shelburne Falls; A. C. Deane, Greenfield; R. C. Ward, Northfield.

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HAMPDEN.—Drs. T. F. Breck, L. S. Brooks, Springfield; G. E. Fuller, Monson; H. Gamwell, Westfield; W. Holyoke, Palmer; G. C. McClean, Springfield; W. M. E. Mellen, Chicopee; A. F. Reed, Holyoke.

HAMPSHIRE.—Drs. J. M. Fay, G. A. Preston, Northampton; H. H. Seelye, Amherst; J. W. Winslow, Easthampton; J. Yale, Ware.

MIDDLESEX EAST.—Drs. A. H. Cowdrey, Stoneham; F. W. Graves, J. M. Harlow, S. W. Kelley, Woburn.

MIDDLESEX NORTH.—Drs. H. R. Brissett, F. W. Chadbourne, J. J. Colton, Lowell; N. B. Edwards, North Chelmsford; C. I. Fisher, Tewksbury; L. Huntress, W. B. Jackson, Lowell; H. C. Lane, Billerica; W. H. Lathrop, H. J. Smith, C. P. Spalding, Lowell.

MIDDLESEX SOUTH.—Drs. Z. B. Adams, Framingham; W. A. Bell, Somerville; C. H. Cook, Natick; S. W. Driver, Cambridge; T. M. Durell, Somerville; D. M. Edgerly, Cambridgeport; W. Ela, E. Farnham, Cambridge; E. J. Forster, Charlestown; J. L. Harriman, Hudson; W. H. Hildredth, Newton Upper Falls; R. L. Hodgdon, Arlington; H. Holmes, Lexington; E. G. Hoitt, Marlboro'; J. A. Mead, Watertown; G. A. Oviatt, South Sudbury; F. E. Porter, Auburndale; L. R. Stone, Newton; G. E. Titcomb, Concord; G. J. Townsend, South Natick; C. E. Vaughan, H. P. Walcott, Cambridge; W. W. Wellington, Cambridgeport; J. W. Willis, Waltham; M. Wyman, Cambridge.

NORFOLK.—Drs. W. P. Bolles, Roxbury; H. W. Broughton, Jamaica Plain; W. Channing, Brookline; B. E. Cotting, Roxbury; B. Cushing, Dorchester; E. F. Dunbar, Roxbury; H. C. Ernst, Jamaica Plain; W. S. Everett, Hyde Park; J. A. Finn, Roxbury; D. S. Fogg, Norwood; D. D. Gilbert, Dorchester; A. H. Hodgdon, Dedham; A. R. Holmes, Canton; H. P. Jaques, Milton; E. C. Norton, Norwood; G. K. Sabine, Brookline; C. E. Stedman, Dorchester; J. Stedman, Jamaica Plain; J. A. Tanner, Dorchester; J. A. Winkler, Jamaica Plain.

NORFOLK SOUTH.—Drs. W. A. Drake, North Weymouth; J. H. Gilbert, Quincy; J. H. Robbins, Hingham.

PLYMOUTH.—Drs. J. H. Averill, Campello; H. F. Borden,

E. A. Chase, Brockton; H. W. Dudley, Abington; F. J. Ripley, Brockton; F. G. Wheatley, North Abington.

SUFFOLK.—Drs. S. L. Abbott, J. B. Ayer, H. J. Barnes, C. J. Blake, A. N. Blodgett, H. I. Bowditch, E. H. Brigham, *Librarian*, F. E. Bundy, J. F. Bush, A. T. Cabot, Boston; B. F. Campbell, East Boston; J. R. Chadwick, D. W. Cheever, J. W. Cushing, E. G. Cutler, F. W. Draper, *Treasurer*, Boston; T. W. Fisher, South Boston; R. H. Fitz, C. F. Folsom, Boston; M. F. Gavin, South Boston; C. M. Green, J. O. Green, F. B. Greenough, W. H. H. Hastings, W. C. Holyoke, J. Homans, W. Ingalls, B. J. Jeffries, C. M. Jones. F. I. Knight, A. L. Mason, J. H. McCollom, A. E. McDonald, F. Minot, A. B. Morong, C. B. Porter, A. Post, C. P. Putnam, W. L. Richardson, T. M. Rotch, G. B. Shattuck, G. C. Shattuck, B. S. Shaw, A. D. Sinclair, A. M. Sumner, C. W. Swan, *Corresponding Secretary*, G. G. Tarbell, O. F. Wadsworth, J. C. Warren, Boston; A. P. Weeks, Chelsea; J. C. White, E. N. Whittier, E. Wigglesworth, H. W. Williams, Boston.

WORCESTER.—Drs. M. Bemis, Worcester; A. G. Blodgett, West Brookfield; W. Davis, G. E. Francis, T. H. Gage, Worcester; E. B. Harvey, Westboro'; J. W. Hastings, Warren; H. A. Jewett, Northboro'; H. S. Knight, Worcester; W. H. Lincoln, Millbury; J. O. Marble, Worcester; G. M. Morse, Clinton; W. E. Rice, North Grafton; G. C. Webber, Millbury; L. Wheeler, A. Wood, Worcester.

WORCESTER NORTH.—Drs. R. F. Andrews, Gardner; L. W. Baker, Baldwinsville; J. M. Blood, Ashby; L. G. Chandler, Townsend; C. H. Rice, Fitchburg.

Censors.

BARNSTABLE.—Drs. S. T. Davis, Orleans; G. W. Doane, Hyannis; H. S. Kelley, Jr., Dennisport; J. E. Pratt, Sandwich; W. N. Stone, Wellfleet.

BERKSHIRE.—Drs. J. F. A. Adams, Pittsfield; W. P. Small, Great Barrington; W. A. Smith, Hinsdale; L. C. Swift, Pittsfield; L. D. Woodbridge, Williamstown.

BRISTOL NORTH.—Drs. H. H. Baker, South Dighton; W. Y. Fox, M. Perry, A. Rogers, Taunton; A. M. Round, Norton.

Bristol South.—Drs. A. B. Cushman, South Dartmouth; W. A. Dolan, J. H. Gifford, Fall River; M. H. Leonard, New Bedford; E. M. Whitney, Fair Haven.

Essex North.—Drs. J. F. Croston, C. E. Durant, Haverhill, E. P. Hurd, Newburyport; F. W. Kennedy, Lawrence; J. F. Young, Newburyport.

Essex South.—Drs. W. E. Holbrook, H. W. Newhall, Lynn; W. T. Parker, E. L. Peirson, Salem; G. A. Stickney, Beverly.

Franklin.—Drs. E. G. Best, Turner's Falls; C. Bowker, Bernardston; F. J. Canedy, F. H. Drew, Shelburne Falls; C. C. Messer, Turner's Falls.

Hampden.—Drs. W. H. Chapin, Springfield; F. Holyoke, Holbrook; W. H. Pomerey, P. A. Sprague, Springfield; A. F. Tracy, Westfield.

Hampshire.—Drs. C. R. Gardner Northampton; L. V. Gibbs, Worthington; I. C. Hill, Haydenville; A. H. Hoadley, G. D. Thayer, Northampton.

Middlesex East.—Drs. C. E. Chase, J. H. Conway, Woburn; M. A. Cummings, Winchester; E. S. Jack, F. H. Morse, Melrose.

Middlesex North.—Drs. B. R. Benner, G. J. Bradt, W. A. Johnson, J. F. Sullivan, Lowell; A. Howard, Chelmsford.

Middlesex South.—Drs. D. E. Baker, Newtonville; C. K. Cutter, Charlestown; O. H. Marion, Allston; W. D. Swan, Cambridge; A. Worcester, Waltham.

Norfolk.—Drs. A. B. Coffin, S. Crowell, Dorchester; A. P. Perry, Jamaica Plain; I. W. Starbird, Dorchester; C. F. Withington, Roxbury.

Norfolk South.—Drs. S. C. Bridgham, South Braintree; C. A. Dorr, South Hingham; W. A. Drake, North Weymouth; O. H. Howe, Cohasset; E. N. Mayberry, South Weymouth.

Plymouth.—Drs. J. E. Bacon, Brockton; N. C. King, Campello; A. V. Lyon, Brockton; A. A. MacKeen, Whitman; N. K. Noyes, Hanover.

Suffolk.—Drs. H. L. Burrell, F. H. Davenport, G. M. Garland, F. B. Harrington, H. F. Vickery, Boston.

WORCESTER.—Drs. F. E. Corey, Westboro'; W. B. Cushman, Oxford; H. S. Knight, W. T. Souther, W. C. Stevens, Worcester.

WORCESTER NORTH.—E. L. Fiske, Fitchburg; J. G. Henry, Winchendon; A. W. Sidney, C. W. Spring, J. W. Stimpson, Fitchburg.

Commissioners of Trials.

BARNSTABLE	G. N. Munsell	Harwich.
BERKSHIRE	F. K. Paddock	Pittsfield.
BRISTOL NORTH	C. Howe	Taunton.
BRISTOL SOUTH	H. S. B. Smith	Middleboro'.
ESSEX NORTH	F. A. Howe	Newburyport.
ESSEX SOUTH	H. Colman	Lynn.
FRANKLIN	C. G. Trow	Sunderland.
HAMPDEN	S. W. Bowles	Springfield.
HAMPSHIRE	D. W. Miner	Ware.
MIDDLESEX EAST	W. S. Brown	Stoneham.
MIDDLESEX NORTH	J. C. Irish	Lowell.
MIDDLESEX SOUTH	G. C. Pierce	Ashland.
NORFOLK	J. W. Chase	Dedham.
NORFOLK SOUTH	J. A. Gordon	Quincy.
PLYMOUTH	H. F. Borden	Brockton.
SUFFOLK	C. W. Swan	Boston.
WORCESTER	E. B. Harvey	Westboro'.
WORCESTER NORTH	B. H. Hartwell	Ayer.

Officers of the District Medical Societies.

BARNSTABLE.—Dr. S. Pitcher, Hyannis, *President;* Dr. F. W. Pierce, Marston's Mills, *Vice-President;* Dr. E. E. Hawes, Hyannis, *Secretary;* Dr. C. M. Hulbert, South Dennis, *Treasurer.*

BERKSHIRE.—Dr. H. Bushnell, North Adams, *President;* Dr. A. T. Wakefield, Sheffield, *Vice-President;* Dr. H. Colt, Pittsfield, *Secretary;* Dr. W. L. Paddock, Pittsfield, *Treasurer;* Dr. W. W. Leavitt, Pittsfield, *Librarian.*

BRISTOL NORTH.—Dr. F. A. Hubbard, Taunton, *President;* Dr. E. F. Galligan, Taunton, *Vice-President;* Dr. W. Y. Fox, Taunton, *Secretary;* Dr. J. B. Murphy, Taunton, *Treasurer;* Dr. M. Perry, Taunton, *Librarian.*

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BRISTOL SOUTH.—Dr. S. W. Hayes, New Bedford, *President;* Dr. J. H. Jackson, Fall River, *Vice-President;* Dr. A. J. Abbe, Fall River, *Secretary, Treasurer and Librarian.*

ESSEX NORTH.—Dr. G. W. Snow, Newburyport, *President;* Dr. R. C. Huse, Georgetown, *Vice-President;* Dr. M. D. Clarke, Haverhill, *Secretary and Treasurer.*

ESSEX SOUTH.—Dr. W. W. Eaton, Danvers, *President;* Dr. P. L. Sanborn, Marblehead, *Vice-President;* Dr. J. E. Simpson, Salem, *Secretary;* Dr. G. Z. Goodell, Salem, *Treasurer;* Dr. R. J. McCormack, Salem, *Librarian.*

FRANKLIN.—Dr. W. H. Pierce, Bernardston, *President;* Dr. G. P. Twitchell, Greenfield, *Vice-President;* Dr. F. H. Zabriskie, Greenfield, *Secretary and Treasurer.*

HAMPDEN.—Dr. F. W. Chapin, Springfield, *President;* G. W. Davis, Holyoke, *Vice-President;* Dr. J. T. Herrick, Springfield, *Secretary, Treasurer and Librarian.*

HAMPSHIRE.—Dr. G. F. Thomson, Belchertown, *President;* Dr. H. A. Deane, Easthampton, *Vice-President;* Dr. A. H. Hoadley, Northampton, *Secretary;* Dr. C. W. Cooper, Northampton, *Treasurer;* Dr. G. D. Thayer, Northampton, *Librarian.*

MIDDLESEX EAST.—Dr. J. S. Clark, Melrose, *President;* Dr. C. C. Odlin, Melrose, *Vice-President;* Dr. D. March, Jr., Winchester, *Secretary;* Dr. J. O. Dow, Reading, *Treasurer.*

MIDDLESEX NORTH.—Dr. C. M. Fisk, Lowell, *President;* Dr. F. C. Plunkett, Lowell, *Vice-President;* Dr. W. G. Eaton, Lowell, *Secretary;* Dr. O. A. Willard, Lowell, *Treasurer;* Dr. C. A. Viles, Lowell, *Librarian.*

MIDDLESEX SOUTH.—Dr. J. T. G. Nichols, Cambridge, *President;* Dr. E. R. Cutler, Waltham, *Vice-President;* Dr. F. W. Taylor, North Cambridge, *Secretary;* Dr. W. Ela, Cambridge, *Treasurer;* Dr. C. D. McCarthy, Malden, *Librarian.*

NORFOLK.—Dr. J. Seaverns, Roxbury, *President;* Dr. J. S. Greene, Dorchester, *Vice-President;* Dr. J. C. D. Pigeon, Roxbury, *Secretary and Librarian;* Dr. E. G. Morse, Roxbury, *Treasurer.*

NORFOLK SOUTH.—Dr. C. C. Tower, South Weymouth, *President;* Dr. J. W. Spooner, Hingham, *Vice-President;* Dr. J. F.

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Welch, Quincy, *Secretary and Treasurer;* Dr. S. C. Bridgham, South Braintree, *Librarian.*

PLYMOUTH.—Dr. A. E. Paine, Brockton, *President;* Dr. E. A. Chase, Brockton, *Vice-President;* Dr. A. V. Lyon, Brockton, *Secretary and Treasurer;* Dr. W. P. Chisholm, Brockton, *Librarian.*

SUFFOLK.—Dr. E. N. Whittier, Boston, *President;* Dr. A. L. Mason, Boston, *Vice-President;* Dr. J. J. Minot, Boston, *Secretary;* Dr. E. M. Buckingham, Boston, *Treasurer;* Dr. B. J. Jeffries, Boston, *Librarian.*

WORCESTER.—Dr. G. E. Francis, Worcester, *President;* Dr. F. W. Brigham, Shrewsbury, *Vice-President;* Dr. G. O. Ward, Worcester, *Secretary;* Dr. H. Gage, Worcester, *Treasurer;* Dr. A. C. Getchell, Worcester, *Librarian.*

WORCESTER NORTH.—Dr. F. W. Russell, Winchendon, *President;* Dr. F. H. Thompson, Fitchburg, *Vice-President;* Dr. E. J. Cutter, Leominster, *Secretary;* Dr. E. L. Fisk, Fitchburg, *Treasurer;* Dr. A. W. Sidney, Fitchburg, *Librarian.*

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Massachusetts Medical Society.

PROCEEDINGS OF THE COUNCILLORS.

October 7, 1891.

A Stated Meeting of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, October 7, 1891, at 11 o'clock, A.M.

The President, Dr. Amos H. Johnson, in the chair.

The following Councillors were present:

Bristol South.
D. E. Cone,
W. T. Learned.

Essex North.
F. A. Howe,
L. A. Woodbury.

Essex South.
J. Allen,
C. Burnham,
H. K. Foster,
C. W. Galloupe,
M. A. Jewett,
A. H. Johnson.

Middlesex East.
A. H. Cowdrey,
J. M. Harlow.

Middlesex North.
H. R. Brissett,
N. B. Edwards,
W. B. Jackson,
W. H. Lathrop.

Middlesex South.
Z. B. Adams,
C. H. Cook,
T. M. Durell,
D. M. Edgerly,
W. Ela,
E. Farnham,
E. J. Forster,
J. L. Harriman,
W. H. Hildreth,
R. L. Hodgdon,
H. Holmes,
J. A. Mead,
G. A. Oviatt,
L. R. Stone,
G. E. Titcomb,
C. E. Vaughan,
H. P. Walcott,
M. Wyman.

Norfolk.
H. W. Broughton,
W. Channing,
B. E. Cotting,
E. F. Dunbar,
D. D. Gilbert,
C. E. Stedman.

Norfolk South.
J. H. Gilbert.

Plymouth.
H. W. Dudley,
F. G. Wheatley.

Suffolk.
S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
E. H. Brigham,
F. E. Bundy,
J. F. Bush,
B. F. Campbell,
J. R. Chadwick,
J. W. Cushing,
E. G. Cutler,
F. W. Draper,
T. W. Fisher,
R. H. Fitz,

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M. F. Gavin,
C. M. Green,
F. B. Greenough,
W. H. H. Hastings,
W. Ingalls,
B. J. Jeffries,
C. M. Jones,
F. I. Knight,
A. L. Mason,
F. Minot,
A. B. Morong,
C. B. Porter,
C. P. Putnam,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
B. S. Shaw,
A. M. Sumner,
C. W. Swan,
J. C. Warren,
A. P. Weeks,
J. C. White,
H. W. Williams.

Worcester.
W. Davis,
G. E. Francis,
H. A. Jewett,
J. O. Marble,
G. M. Morse.

Total, 85.

The record of the previous meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Vermont.—Drs. A. M. Smith, of Williamstown; C. N. Chamberlain, of Lawrence.

New York.—Drs. G. Haven, E. J. Forster, of Boston.

New York State Medical Association.—Drs. J. T. G. Nichols, of Cambridge; J. Homans, 2d, of Boston.

In accordance with the recommendations of Committees appointed at the last meeting, it was voted that the following be restored to their membership in the Society:

William Henderson Ruddick, of South Boston.
Rufus William Sprague, of Charlestown.

The resignation of Dr. Draper from the office of Treasurer of the Society was presented, to take effect upon the election and qualification of his successor. After reference to the Committee on Membership and Finances, the resignation was accepted.

Voted,—That the thanks of the Council be given to Dr. Draper for the admirable manner in which he has performed the duties of his office for the past sixteen years.

On ballot, Dr. Edward J. Forster, of Boston, was elected Treasurer of the Society.

Voted,—That the Committee on Membership and Finances be authorized and directed to receive the funds and papers from the retiring Treasurer, to audit the same, and to transfer them to the

Treasurer elect, receiving from the latter the usual bond with sureties.

Dr. Chadwick announced, that in his capacity as a Committee of one to secure the portrait of Dr. Samuel Danforth, which was bequeathed to the Society by Miss Elizabeth Danforth, he had been successful in his efforts, and that the portrait is now in the possession of the Society.

Adjourned at 12.10 P.M.

FRANCIS W. GOSS,
Recording Secretary.

FEBRUARY 3, 1892.

A STATED MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Wednesday, February 3, 1892, at 11 o'clock, A.M.

The President, DR. AMOS H. JOHNSON, in the chair.

The following Councillors were present:

Barnstable.
B. D. Gifford.

Berkshire.
F. K. Paddock.

Bristol South.
W. T. Learned.

Essex North.
C. G. Carleton.

Essex South.
J. Allen,
C. W. Galloupe,
M. A. Jewett,
A. H. Johnson.

Middlesex East.
F. W. Graves.

Middlesex North.
W. B. Jackson,
C. P. Spalding.

Middlesex South.
Z. B. Adams,
W. A. Bell,
C. H. Cook,
T. M. Durell,
E. Farnham,
E. J. Forster,
W. H. Hildreth,
R. L. Hodgdon,
J. A. Mead,
L. R. Stone.

Norfolk.
W. Channing,
B. E. Cotting,
W. S. Everett,
D. D. Gilbert,
A. H. Hodgdon,
A. R. Holmes,
C. E. Stedman,
J. Stedman.

Norfolk South.
J. H. Gilbert.

Suffolk.
S. L. Abbot,
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,
J. F. Bush,
B. F. Campbell,
J. R. Chadwick,
E. G. Cutler,
F. W. Draper,
T. W. Fisher,

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R. H. Fitz,
M. F. Gavin,
C. M. Green,
J. O. Green,
F. B. Greenough,
W. H. H. Hastings,
W. C. Holyoke,
J. Homans,
B. J. Jeffries,
F. I. Knight,
J. H. McCollom,
F. Minot,
C. B. Porter,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
B. S. Shaw,
A. D. Sinclair,
C. W. Swan,
G. G. Tarbell,
J. C. Warren,
A. P. Weeks,
J. C. White,
E. N. Whittier.

Worcester.
E. B. Harvey,
J. O. Marble.

Worcester North.
R. F. Andrews,
L. W. Baker.

Total, 69.

The record of the last meeting was read and accepted.

The following were appointed Delegates to other State Medical Societies:

Maine.—Drs. G. W. Snow, of Newburyport; C. C. Tower, of South Weymouth.

New Hampshire.—Drs. F. W. Graves, of Woburn; H. K. Foster, of Peabody.

Rhode Island.—Drs. D. M. Edgerly, of Cambridgeport; C. C. Odlin, of Melrose.

Connecticut.—Drs. A. H. Johnson, of Salem; J. C. Warren, of Boston; H. R. Stedman, of Roslindale.

New Jersey.—Drs. F. A. Rogers, of Brewster; J. A. Gage, of Lowell.

The following Committees were appointed:

To Audit the Treasurer's Accounts.—Drs. J. H. McCollom, E. P. Gerry.

To Examine the By-Laws of District Societies.—Drs. S. D. Presbrey, J. C. White, F. W. Chapin.

The Committee on Membership and Finances reported through Dr. Minot. In accordance with their recommendation it was voted that the following be allowed to retire:

Francis Collamore, of North Pembroke.
G. M. Morse, of Clinton.
B. S. Codman, of Boston.

Also, that the following be dropped for five years' delinquency in assessments:

J. A. Flynn, of Pittsfield.

Also, that the following be restored to his Fellowship in the Society:

Charles Whitney Page, of Danvers.

The Committee further reported that the following had surrendered their Fellowship under By-Law VI. by removal from the State:

F. S. Bunker, of Maine.
L. C. Bussier, of Canada.
William Barnes, of Illinois.
W. F. Cunningham, of England.
R. F. Dearborn, of Michigan.
W. G. Dobson, of Nova Scotia.
Burnside Foster, of Minnesota.
J. M. T. Finney, of Maryland.
C. H. Hamilton, of Pennsylvania.
Mary A. Hall, of California.
C. D. Jones, of New Hampshire.
H. W. Hall, of Washington.
B. O. Kinnear, of New York.
E. R. Lewis, Jr., of Rhode Island.
O. H. Lamb, of North Carolina.
N. R. Miller.
J. D. McGowan, of Illinois.
M. C. McGannon, of Canada.
F. Mansfield, of New York.
J. D. O'Connell, of New York.
C. T. Peckham, of Tennessee.
R. Peterson, of Michigan.
F. A. Stewart, of Tennessee.
H. A. Shaw, of Rhode Island.
T. G. Simons, of Rhode Island.
S. R. Towne, of Nebraska.
J. B. Upham, of New York.
J. B. Walker, of Illinois.
F. B. Whittesey, of West Indies.
R. A. Wheaton, of Minnesota.
G. L. Woods, of Colorado.

The Committee also reported that in accordance with a

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vote of the Councillors, they have received the funds and papers of the Society from the retiring Treasurer, Dr. Draper, have audited the same and found them entirely correct, and have transferred them to the Treasurer elect, Dr. Forster, receiving from the latter the usual bond with sureties.

Voted,—That the following be elected to Honorary Membership:

Dr. Gerasime Phokas, of Athens, Greece.

A petition was presented from the Massachusetts Society for the Prevention of Cruelty to Animals, requesting action on the part of the Massachusetts Medical Society, in the form of resolution or otherwise, as to whether in its judgment any law, and if so what law, should be enacted by our Legislature to restrict or limit the practice of vivisection by physicians, medical or other students, or pupils in medical or other colleges or schools.

Voted,—That a Committee of three be appointed by the chair to report on the petition at a future meeting.

The following were appointed to constitute the Committee:

H. P. Bowditch, of Boston; F. A. Howe, of Newburyport; J. F. A. Adams, of Pittsfield.

Voted,—That a Committee of five be appointed by the President to report to the Council at a future meeting, on what changes, if any, may be necessary or expedient to secure a uniform examination of candidates for Fellowship.

The following were appointed as the Committee:

T. M. Durell, of Middlesex South; G. C. McClean, of Hampden; J. H. McCollom, H. L. Burrell, of Suffolk; C. F. Withington, of Norfolk District.

Adjourned at 12, noon.

FRANCIS W. GOSS,
Recording Secretary.

JUNE 7, 1892.

THE ANNUAL MEETING of the Councillors was held in the hall of the Medical Library Association, No. 19 Boylston Place, Boston, on Tuesday, June 7, 1892, at 11 o'clock, A.M.

The President, Dr. AMOS H. JOHNSON, in the chair.

The following Councillors were present:

Barnstable.
C. M. Hulbert,
G. N. Munsell,
F. A. Rogers.

Berkshire.
J. F. A. Adams,
H. Bushnell,
F. K. Paddock.

Bristol North.
H. B. Baker,
A. S. Deane,
W. S. Robinson.

Bristol South.
W. A. Dolan.

Essex North.
E. W. Bullock,
M. D. Clarke,
H. J. Cushing,
G. C. Howard,
H. G. Leslie,
G. W. Snow,
J. F. Young.

Essex South.
H. Colman,
W. W. Eaton,
J. W. Goodell,
A. H. Johnson,
T. Kittredge,
P. L. Sanborn.

Franklin.
N. P. Wood.

Hampden.
F. W. Ellis,
G. C. McClean,
F. F. Parker.

Middlesex East.
A. H. Cowdrey,
J. M. Harlow,
S. W. Kelley.

Middlesex North.
H. R. Brissett,
F. W. Chadbourne,
J. J. Colton,
N. B. Edwards,
H. B. Howard,
L. Huntress,
W. B. Jackson,
A. C. Lane,
W. H. Lathrop,
H. J. Smith,
C. P. Spalding.

Middlesex South.
W. A. Bell,
R. A. Blood,
C. H. Cook,
T. M. Durell,
W. Ela,
R. L. Hodgdon,
H. Holmes,
J. A. Mead,
J. T. G. Nichols,
G. A. Oviatt,
L. R. Stone,
J. L. Sullivan,
G. E. Titcomb,
G. J. Townsend,
C. E. Vaughan,
W. W. Wellington.

Norfolk.
E. H. Baxter,
A. W. Blair,
W. P. Bolles,
F. H. Brown,
B. E. Cotting,
D. D. Gilbert,
A. H. Hodgdon,
J. Kittredge,
E. C. Norton,
A. P. Perry,
G. K. Sabine,
I. W. Starbird,
J. Stedman.

Plymouth.
H. W. Dudley,
B. F. Hastings,
F. G. Wheatley.

Suffolk.
J. B. Ayer,
H. J. Barnes,
A. N. Blodgett,

E. H. Brigham,
J. F. Bush,
B. F. Campbell,
D. W. Cheever,
J. W. Cushing,
F. W. Draper,
T. W. Fisher,
C. F. Folsom,
C. M. Green,
J. O. Green,
W. H. H. Hastings,
W. Ingalls,
B. J. Jeffries,
F. I. Knight,
A. L. Mason,
J. H. McCollom,
A. E. McDonald,
F. Minot,
A. B. Morong,
C. P. Putnam,
W. L. Richardson,
T. M. Rotch,
G. B. Shattuck,
A. M. Sumner,
C. W. Swan,
G. G. Tarbell,
O. F. Wadsworth,
J. C. Warren,
A. P. Weeks,
W. F. Whitney,
H. W. Williams.

Worcester.

M. Bemis,
A. G. Blodgett,
P. P. Comey,
W. Davis,
T. H. Gage,
E. B. Harvey,
J. W. Hastings,
S. P. Holbrook,
H. A. Jewett,
G. M. Morse,
G. C. Webber.

Worcester North.

L. W. Baker,
J. M. Blood,
L. G. Chandler,
E. J. Cutter.

Total, 122.

The record of the previous meeting was read and accepted.

The Secretary read the names of new and of deceased Fellows.

The Treasurer, Dr. Forster, read his annual report.

The Auditing Committee reported that they found the Treasurer's accounts correctly cast and properly vouched, and that he has in his possession the various securities and funds called for.

The Treasurer's report was then accepted.

The Committee on Membership and Finances reported through Dr. Minot and recommended that $1400.00 of the surplus in the treasury be distributed among the District Societies.

The recommendation of the Committee was adopted.

On recommendation of the same Committee it was voted that the following be allowed to retire:

E. P. Abbé, of New Bedford.
J. O. Dow, of Reading.
N. Downes, of Boston.

W. W. Gardner, of Springfield.
J. Manning, of Rockport.
G. H. Randall, of North Rehoboth.
J. P. Reynolds, of Boston.
W. M. Trow, of Northampton.
J. W. Winslow, of Easthampton.

Also, that the following be allowed to resign:

F. S. Churchill, of Calumet, Mich.
J. H. Denny.
Eliza B. L. Norton, of Norwood.
B. DeF. Sheedy, of Bridgeport, Conn.
V. O. Taylor, of Providence, R. I.
E. W. Warren, of Ansonia, Conn.

Also, that the following be dropped for five years' delinquency in assessments:

C. J. Curran, of North Adams.
L. F. Humeston, of Holyoke.
E. H. Quimby, of Malden.
T. E. McOwen, of Lowell.

The Committee further reported that the following had lost their Fellowship under By-Law VI., by removal from the State:

C. L. Randall, of Standish, Me.
F. L. Smith, of Bridgeport, Conn.

The Committee on Publications presented its report.

The Committee on the By-Laws of the District Societies recommended, and it was voted,—That any proposed alteration or amendment of the By-Laws of any District Society be referred to the Committee before such alteration or amendment is adopted.

Voted,—That the following be restored to Fellowship:

Eben True Aldrich, of Watertown.
James Richmond Barss, of Malden.
Hiram Fred Markley Smith, of Orange.
Charles Milo Wilson, of Shelburne Falls.

The Committee appointed to consider the petition of the Massachusetts Society for the Prevention of Cruelty to

Animals regarding vivisection reported through Dr. H. P. Bowditch, as follows:

Whereas, the Massachusetts Society for the Prevention of Cruelty to Animals has asked for some official action on the part of the Massachusetts Medical Society in the form of a resolution, or otherwise, as to whether in their judgment, any law, and if so, what law should be enacted by our legislature to restrain or limit the practice of vivisection by physicians, medical or other students, or pupils in medical or other colleges or schools.

Therefore, resolved that the Councillors are not aware that vivisections are practised in this State in an unnecessary or cruel manner.

That the existing statutes furnish sufficient security against cruelty in vivisection as well as against cruelty in general.

That experience has shown it to be very undesirable to impose restrictions of any kind upon the advancement of medical science by the researches of properly qualified persons.

That in view of the above facts, it is, in the opinion of the Councillors, inexpedient to legislate upon this subject.

That a copy of the above preamble and resolutions be transmitted to the Massachusetts Society for the Prevention of Cruelty to Animals.

The report was accepted and its recommendations adopted.

The Librarian, Dr. Brigham, presented his report.

The Committee on Nominations reported a list of candidates for the offices of the Society for the ensuing year, and the same were elected by ballot:

President . .	Dr. JAMES C. WHITE, of Boston.
Vice-President .	Dr. FRANCIS A. HOWE, of Newburyport.
Treasurer . .	Dr. EDWARD J. FORSTER, of Boston.
Corresponding Sec'y	Dr. CHARLES W. SWAN, of Boston.
Recording Secretary	Dr. FRANCIS W. GOSS, of Roxbury.
Librarian . .	Dr. EDWIN H. BRIGHAM, of Boston.

Dr. J. T. G. NICHOLS, of Cambridge, was chosen Orator, and

Dr. GEORGE W. GAY, of Boston, Anniversary Chairman, for the Annual Meeting of the Society in 1893.

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Voted,—That the next Annual Meeting of the Society be held in Boston, on the second Wednesday in June, 1893.

On nomination by the President, the following Standing Committees were appointed:

Of Arrangements.

J. Homans, 2d, F. M. Briggs, J. C. Munro,
J. T. Bowen, H. Jackson, A. Thorndike.

On Publications.

G. C. Shattuck, B. E. Cotting, O. F. Wadsworth.

On Membership and Finances.

F. Minot, F. W. Draper, J. Stedman,
E. G. Cutler, L. R. Stone.

To Procure Scientific Papers.

H. P. Walcott, H. L. Burrell, L. Wheeler,
F. H. Zabriskie, S. B. Woodward, C. W. Townsend.

On Ethics and Discipline.

G. J. Townsend, G. E. Francis, F. C. Shattuck,
C. G. Carleton, E. Cowles.

On Medical Diplomas.

E. J. Forster, F. H. Hooper, H. E. Marion.

A communication from the Bristol North District Medical Society concerning fees for the commitment of the insane was referred to Drs. C. F. Folsom, F. A. Hubbard and F. B. Harrington, as a Committee to report at a future meeting.

A communication concerning a bill to create a Cabinet Officer of Public Health was referred to Drs. H. P. Walcott, S. W. Abbott and Henry Jackson, as a Committee to report at a future meeting.

A communication regarding the Pan-American Medical Congress was referred to Drs. E. N. Whittier, J. O. Marble and F. W. Chapin, as a Committee to report at the next meeting.

Adjourned at 12.20 P.M.

FRANCIS W. GOSS,
Recording Secretary.

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Addendum, page 35.—Meeting of Councillors, February 4, 1891.

The Committee appointed June 10, 1890, to consider the petition for a change in the boundary line between the Norfolk and Suffolk Districts, reported through Dr. Seaverns, and recommended that the petitioners have leave to withdraw. The recommendation was adopted.

Massachusetts Medical Society.

PROCEEDINGS OF THE SOCIETY.

ANNUAL MEETING.

First Day.

Sectional meetings of the Society were held in the Building of the Massachusetts Charitable Mechanic Association, Boston, on Tuesday, June 7, 1892, at 2 o'clock, P.M.

The sections were organized and papers were presented as follows:

SECTION IN MEDICINE.

Dr. A. H. Johnson, of Salem . . . . . Chairman.
Dr. R. W. Greenleaf, of Boston . . . Secretary.

The Relations of Bacteria to Influenza.—By Dr. Henry Jackson, of Boston.

Pneumonia in the Recent Epidemics.—By Dr. W. E. Fay, of Boston. Drs. A. L. Mason and G. B. Shattuck discussed these papers.

The Nervous and Mental Sequelæ of Influenza.—By Dr. P. C. Knapp, of Boston. Dr. J. J. Putnam made remarks upon this paper.

SECTION IN SURGERY.

Dr. T. H. Gage, of Worcester . . . . Chairman.
Dr. C. L. Scudder, of Boston . . . . . Secretary.

Bacteriological and Clinical Investigations into the new Antiseptic Dermatol.—By Dr. A. K. Stone, of Boston.

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THE DIAGNOSIS AND TREATMENT OF POTT'S FRACTURE OF THE ANKLE.—By Dr. L. A. Stimson, of New York City. Discussion by Dr. H. L. Burrell.

ACUTE INTESTINAL OBSTRUCTION.—THE SYMPTOMS AND DIAGNOSIS: By Dr. F. C. Shattuck, of Boston. THE SURGICAL ASPECTS: By Drs. John Homans, J. C. Warren, M. H. Richardson, A. T. Cabot, of Boston; J. C. Irish, of Lowell.

SECTION IN OBSTETRICS AND GYNECOLOGY.

Dr. J. R. CHADWICK, of Boston . . . . Chairman.
Dr. GEORGE HAVEN, of Boston . . . . Secretary.

RESUMÉ OF 100 CASES AT THE KNOWLES MATERNITY, WORCESTER.—By Dr. G. O. Ward, of Worcester.

ALEXANDER'S OPERATION.—By Dr. W. M. Conant, of Boston. Discussion by Drs. E. P. Hurd, J. R. Chadwick.

HYDATIDIFORM MOLES.—By Dr. G. A. Craigin, of Boston. Discussion by Drs. H. Holmes, J. R. Chadwick, E. Reynolds.

THE TREATMENT OF INFLAMMATORY DISEASES OF THE FALLOPIAN TUBES, WITH CASES.—By Dr. Edward Reynolds, of Boston. Discussion by Drs. A. H. Tuttle and Jones.

At 8 o'clock, P.M., the Shattuck Lecture was given by Dr. J. F. ALLEYNE ADAMS, of Pittsfield.

FRANCIS W. GOSS,
Recording Secretary.

SECOND DAY.

THE Society met in Mechanics Building, Boston, on Wednesday, June 8, 1892, at 9 o'clock, A.M., for the exercises of the one hundred and eleventh Anniversary.

The President, Dr. AMOS H. JOHNSON, in the chair.

The record of the last annual meeting was read and accepted.

The Secretary read the names of Fellows admitted since the last annual meeting, and of Fellows whose deaths had been reported.

Fellows admitted since June 9, 1891.

1892	Abbott, Edward Stanley	Cambridge.
1892	Adams, Chauncey	Taunton.
1891	Ahearne, Cornelius Augustus, Jr.	Lynn.
1892	Allen, Carl A	Holyoke.
1892	Ames, Robert Parker Marr	Springfield.
1891	August, Albert	Cambridge.
1891	Balch, Franklin Greene	Boston.
1891	Beaumont, William Shepherd	Boston.
1891	Bowker, Everett M	Salem.
1892	Bryant, Giles Waite	West Somerville.
1892	Burke, James Joseph	Easthampton.
1892	Burnett, Theodore Crété	Stockbridge.
1892	Burns, Hiram Hutchins	Athol Centre.
1892	Butler, John Edward	Roxbury.
1892	Bychower, Victor	Boston.
1891	Calkin, Barry Howes	Boston.
1892	Clark, Sidney Avery	Northampton.
1892	Cobb, Albert Crocker	Southampton.
1892	Cogswell, George Proctor	Cambridge.
1892	Collier, Lawrence Henry Goodwin	Boston.
1891	Connell, Arthur Irving	Fall River.
1892	Crocker, Benton Pulsifer	Winchendon.
1891	Cummings, Irving Oscar	Georgetown.
1892	Curtis, John Benedict, Jr.	Somerville.
1891	Dane, John	Boston.
1891	Davidson, Kallman Meyer	Boston.
1892	Derby, William Parsons	Boston.
1892	Dinenson, Abraham Isaac	Boston.
1891	Donovan, Henry Vincent	Lawrence.
1891	Duxbury, Joseph Edwards	Boston.
1891	Edson, Carroll Everett	Roxbury.
1892	Fahey, James Charles	Northampton.
1891	Faulkner, William Edward	Keene, N. H.
1892	Faxon, Eudora Meade	Boston.
1892	Fernwick, Joseph Benson	Chelsea.
1892	Fitzgerald, James Bernard	Boston.
1892	Fitz-Hugh, James Alexander	Amesbury.
1891	Francis, Carleton Shurtleff	Worcester.
1891	Gallison, Jefferson Cushing	Franklin.
1892	Gile, John Morton	Tewksbury.
1892	Gleason, Edwin Putnam	Maynard.
1891	Godfrey, Joseph Witter	Littleton.
1892	Goray, James Philip	Fitchburg.
1892	Hamlet, Frank Stanley	Taunton.
1891	Harlow, Granville Albert	Tyngsboro'.

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1891	Harvey, John Franklin	Boston.
1891	Haskell, Nelson Cary	Boston.
1891	Hill, Eugene Woodbury	West Roxbury.
1891	Holder, Oscar Howe	New York, N. Y.
1891	Houghton, Silas Arnold	Brookline.
1892	Jackson, Ralph Wentworth	Fall River.
1891	Jenkins, Thomas Lincoln	Topsfield.
1891	Jewett, Fred Bryce	Tewksbury.
1892	Jones, Lombard Carter	Boston.
1891	Kelley, George Draper	Worcester.
1892	Kellogg, Frederic Leroy	Somerville.
1891	Kenefick, Joseph Aloysius	Boston.
1891	Knight, Augustus Smith	Boston.
1892	Knowlton, Charles Davison	Boston.
1892	LaMarche, Walter Joseph	North Cambridge.
1891	Lawrence, George Washington	Waltham.
1891	Luce, Henry Holmes	Boston.
1891	Lund, Fred Bates	Boston.
1891	Mackenzie, John Milne	Fall River.
1891	Mallory, Frank Burr	Boston.
1891	Martin, Miles	Roxbury.
1892	May, Sarah Russell	Boston.
1891	McCarthy, John Coakley	Malden.
1891	McGuigan, John Joseph	Lynn.
1892	McKenna, Francis Patrick	South Boston.
1891	McQueeney, Francis Joseph	Boston.
1892	Mead, George Nathaniel Plumer	Everett.
1892	Miller, Charles Herman	Dorchester.
1891	Morris, George Patrick	South Boston.
1891	Morris, James Stewart	Revere.
1892	Morse, Charles Ellsworth	Jamaica Plain.
1891	Nash, Horace Milton	Lancaster.
1892	Osgood, Gilman	Rockland.
1892	Parmelee, William Josiah	Cummington.
1892	Patch, William Thurston	Fitchburg.
1891	Payne, James Henry, Jr.	Boston.
1891	Perkins, Jay	Providence, R. I.
1892	Pike, Forrest Wiley	North Chelmsford.
1892	Porter, George Elmer	Chatham.
1891	Rabethge, Charles Armand	Roxbury.
1892	Raddin, Frederick Stocker	Chelsea.
1892	Redmond, James William	South Boston.
1891	Risk, Winthrop Allen	Boston.
1891	Robbins, Fred Gibson	Salem.
1892	Rohrer, Safier Rudolph	Lowell.
1892	Rowen, Henry Stanislaus	Boston.
1891	Russell, William Henry	Ipswich.

1891	Sawyer, Walter Fairbanks	East Somerville.
1891	Smith, William Lord	Boston.
1892	Sprague, George Percy	Roslindale.
1892	Stark, Charles Alvan	Marshfield.
1891	Stebbins, Walter Gay	Boston.
1892	Stedman, Joseph Cyrus	Jamaica Plain.
1892	Stickney, Edwin Pangman, 2d	Sunapee, N. H.
1891	Stowell, Edmund Channing	Boston.
1892	Stutson, William Peckham	Cummington.
1891	Sullivan, Michael Francis	Lawrence.
1891	Swasey, Edward	Worcester.
1891	Taylor, Philip Kittredge	Kingston, R. I.
1891	Tenney, Benjamin	Boston.
1891	Thompson, Charles Oscar	Boston.
1891	Titus, Hermon Franklin	Newton.
1891	Towle, Harvey Parker	Boston.
1891	Tracy, Edward Aloysius	South Boston.
1891	Tully, Edward Joseph	West Fitchburg.
1892	Tyler, Waldo Henry	North Cambridge.
1892	Underwood, Arthur Whitman	Plympton.
1891	Upton, Francis Marion	Stoneham.
1892	Van Allen, Harvey Ward	Springfield.
1892	Vickery, Lucia Florence	Boston.
1891	Walker, Maurice Anson	Boston.
1892	White, William Allen	Boston.
1892	Withington, Alfreda Bosworth	Pittsfield.
1891	Woodbury, William Richardson	Boston.

Total, 119.

List of Deceased Fellows.

Admitted.	Name.	Residence.	Date of Death.	Age.
1841	Ayer, James	Boston	Dec. 31, 1891	76
1835	Bowditch, Henry Ingersoll	Boston	Jan. 14, 1892	83
1881	*Bowman, Sir William	London, England	March 27, 1892	75
1844	Brown, Buckminster	Boston	Dec. 24, 1891	72
1866	Brown, George	Barre	May 9, 1892	68
1870	Brown, James Raymond	Springfield	Jan. 10, 1892	68
1871	Burnham, Cœleb	Lynn	Feb. 18, 1892	56
1846	Cogswell, William	Bradford	Aug. 16, 1891	70
1866	Cushing, Stephen	Boston	March 1, 1892	50
1858	Draper, Joseph	Brattleboro', Vt.	March 17, 1892	58
1844	Drinkwater, Sidney	Haverhill	Nov. 20, 1891	79
1837	Dupee, Horace	Dorchester	Aug. 7, 1891	81
1830	Dyer, Henry	New York, N. Y.	Sept. 21, 1891	87
1868	Earle, Pliny	Northampton	May 17, 1892	82
1880	Emerson, William Carroll	Boston	Oct. 8, 1891	38
1886	Fiske, William Boyd	Cambridge	May 8, 1892	23
1865	Fox, Lorenzo Smith	Lowell	June 23, 1891	51
1849	Garratt, Alfred Charles	New York, N. Y.	June 30, 1891	78

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1853	Hitchcock, Joseph Green Stevens	Foxboro'	Aug.	24, 1891	68
1866	Huse, Ralph Cross	Georgetown	June	1, 1892	48
1887	Jeffries, John Amory	Boston	March	26, 1892	32
1864	Jenkins, Alvin	Great Falls, N. H.	May	3, 1892	79
1874	Jones, Claudius Marcellus	Boston	Jan.	24, 1892	46
1886	Kite, John Alban	Nantucket	Nov.	1, 1891	36
1885	Livermore, George Edward	Lowell	Sept.	4, 1891	36
1846	Lyman, George Hinckley	Boston	Aug.	19, 1891	72
1852	Martin, Oramel	Worcester	April	16, 1892	81
1831	Metcalf, John George	Mendon	Jan.	13, 1892	90
1874	Montgomery, George	Newburyport	March	17, 1892	56
1868	Moore, Samuel Lawrence	Boston	March	13, 1892	56
1871	Page, Prince Woodman	Boston	Sept.	29, 1891	56
1864	Parker, Edgar	Boston	April	9, 1892	51
1850	Patch, Franklin Fletcher	Boston	Nov.	12, 1891	76
1876	*Dom Pedro Secundo	Ex Emp. of Brazil	Dec.	4, 1891	66
1886	Pengra, Charles Philip	Boston	Jan.	31, 1892	31
1850	Pineo, Peter	Hyannis	Sept.	10, 1891	66
1855	Richardson, Horace	Boston	June	18, 1891	61
1850	Savory, Charles Augustus	Lowell	Feb.	2, 1892	78
1866	Sawyer, Edward	Bridgewater	Dec.	21, 1891	51
1854	Smith, William George	Chicopee	Jan.	16, 1892	79
1865	Sproat, Henry Hamilton	Freetown	March	14, 1892	49
1877	Stahl, Albert Thomas	Boston	March	16, 1892	45
1829	Storer, David Humphreys	Boston	Sept.	10, 1891	87
1878	Taylor, William Howland	New Bedford	July	20, 1891	37
1837	Toothaker, Samuel Allen	Melrose	Jan.	12, 1892	84
1884	Vincelette, Arthur Edouard Z.	Lowell	July	8, 1891	36
1864	Willard, Robert	Boston	Feb.	6, 1892	54

*Honorary. Total, 47.

The Treasurer, Dr. Forster, presented his annual report.

Dr. Bullard, in behalf of the legislative Committee on the care and treatment of chronic adult epileptics, reported that action on the subject has been referred to the legislature of next year. It was voted that the Committee be continued.

The Society concurred with the Councillors in their meeting of yesterday, in the passage of resolutions on the petition of the Massachusetts Society for the Prevention of Cruelty to Animals regarding vivisection.

Papers were read as follows:

An Outbreak of Trichinosis in Colrain.—By Dr. F. H. Drew, of Shelburne Falls. Drs. C. W. Macdonald and J. H. McCollom made remarks upon this paper.

The Treatment of Compound Fractures by Modern Methods, with a demonstration of "putting up" adapted to

private practice.—By Drs. H. L. Burrell and E. W. Dwight, of Boston.

THE NECESSITY OF A REVISION OF THE MEDICAL NOMENCLATURE EMPLOYED IN THE VITAL STATISTICS OF MASSACHUSETTS.—By Dr. S. W. Abbott, of Wakefield.

After the reading of this paper it was voted,—That a Committee of three be appointed by the President to report at the next annual meeting upon the question whether any changes are necessary in the classification and nomenclature employed in the Vital Statistics of Massachusetts; the same Committee to report what changes should be made, if any.

Drs. S. W. Abbott, C. F. Folsom and F. W. Draper were appointed to constitute this Committee.

The following delegates from other State Medical Societies were present:

Vermont.—Drs. J. Henry Jackson, Joe W. Jackson.

Rhode Island.—Dr. W. A. Gorton.

Dr. J. H. Jackson presented the greetings of his Society.

At 12 o'clock the Annual Discourse was delivered by Dr. FRANK W. DRAPER, of Boston.

Voted,—That the hearty thanks of the Society be presented to the orator for his instructively historic, eminently valuable, timely-happy and singularly well-written discourse.

The retiring President introduced the President-elect, Dr. JAMES C. WHITE, of Boston.

At 1, P.M., the Annual Dinner, presided over by the Anniversary Chairman, Dr. EDWARD H. BRADFORD, was served to more than eight hundred Fellows and invited guests.

FRANCIS W. GOSS,
Recording Secretary.

TREASURER'S REPORT.

THE Treasurer presents the following report for the year ending 15 April, 1892.

The invested funds are as follows:

The Permanent Fund	$11,253 00	
The Shattuck Fund	9,166 87	
The Phillips Fund	10,000 00	
The Cotting Fund	3,000 00	
Amounting to	$33,420 17	
The balance on hand of cash at the beginning of the year was		$2,725 06
The Receipts have been :—		
Assessments paid direct to the Treasurer		1,890 08
Assessments paid to District Treasurers :		
Barnstable	$95 00	
Berkshire	135 00	
Bristol North	150 00	
Bristol South	300 00	
Essex North	350 00	
Essex South	405 00	
Franklin	150 00	
Hampden	285 00	
Hampshire	180 00	
Middlesex East	140 00	
Middlesex North	385 00	
Middlesex South	790 00	
Norfolk	795 00	
Norfolk South	140 00	
Plymouth	190 00	
Suffolk	1600 00	
Worcester	570 00	
Worcester North	150 00	
		6810 00
Income :		
Permanent Fund	450 00	
Shattuck Fund	366 67	
Phillips Fund	400 00	
Cotting Fund	121 20	
Interest on cash balance	43 50	
		1381 49
Sale of extra dinner tickets		12 00
Making a total of		$12,318 63

The expenses have been :—

The Annual Dinner :		
Caterer	$1,784 00	
Cigars	96 63	
Music	104 00	
Flowers	75 00	
Expense of hall	428 50	
Printing, stationery and postage	19 70	
Carriage hire	14 10	
Incidentals	8 32	
		$2,530 25
The Annual Meeting :		
Stenographers and stereopticon		57 20
Salaries in full to 15 April, 1892		1,261 82
Treasurer's expense :		
Printing, postage and stationery		115 30
Recording Secretary's expense :		
Printing, postage and stationery		134 38
Librarian's expense :		
Printing, postage, stationery and express		459 64
District Treasurers' expense :		
Commissions and incidentals		393 08
Censors' expense :		
Fees, advertising and stationery		508 83
Committee on Publications :		
Braithwaite's Retrospect	$2,357 50	
Communications and Transactions	745 65	
The Shattuck Lecturer	200 00	
Printing, postage and stationery	51 65	
		3,354 80
Committee on Ethics, mileage		5 90
The Cotting Lunch for Councillors		90 00
Annual Rent		150 00
Dividend distributed to the District Societies		1,362 53
Sundry incidental expenses		33 25
Making the total expenses,		$10,456 98
Leaving a balance on hand of		$1,861 65

This balance is distributed as follows :

Unexpended income of Shattuck Fund	$848 61
Unexpended income of Cotting Fund	83 60
Unexpended general income	929 44
	$1,861 65

Dr.	TRIAL BALANCE—15 April, 1892.		Cr.	
Cash		$1,861 65	Property	$33,420 17
Permanent Fund Investment		11,253 30	Permanent Fund	11,253 30
Shattuck Fund Investment		9,166 87	Shattuck Fund	9,166 87
Cotting Fund Investment		3,000 00	Cotting Fund	3,000 00
Phillips Fund Investment		10,000 00	Phillips Fund	10,000 00
Mass. Hosp. Life Ins. Co.		20,420 17	Shattuck Fund Income	848 61
Provident Ins. Savings		1,000 00	Cotting Fund Income	83 60
Suffolk Savings Bank		1,000 00	Profit and loss	929 44
Roxbury Ins. for Savings		1,000 00		
U. S. 4% Bonds		10,000 00		
		$68,701 99		$68,701 99

All of which is respectfully submitted.

EDWARD JACOB FORSTER,
Treasurer.

BOSTON, 8 JUNE, 1892.

BOSTON, 25 MAY, 1892.

The undersigned, a duly appointed Auditing Committee, having examined the books of the Treasurer, find them correctly cast and properly vouched; and also find that he has in his possession the various securities and funds called for.

J. H. McCOLLOM,
E. PEABODY GERRY, } *Committee.*

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1892—1893.

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C. G. Carleton. E. Cowles.

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